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## URETERAL TRANSPLANTATION FOR EXSTROPHY OF THE BLADDER

CHARLES H. MAYO AND CLAUDE F. DIXON

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OF the congenital anomalies exstrophy of the urinary bladder is one of the most interesting. This condition which is brought about by the incomplete development of the urogenital system is not common. According to Spooner it occurs on an average of about once in every 18 000 to 20 000 births. Others state that the anomaly occurs as infrequently as once in 25 000 births. Unless some measures are taken to correct the condition or to compensate for it the individuals in whom it occurs are chronic invalid throughout life and because of the constant uncontrolled flow of urine they are a nuisance to themselves and to others who are around them.

The development of the urinary system and the reproductive system is so closely related that when a congenital anomaly is found in one system it is not uncommon to find one or more deformities in the other. Epispadias and hypospadias and even hermaphroditism may be found. Several times we have observed a bifid uterus in connection with exstrophy of the bladder.

Occasionally at the time of operation in cases of exstrophy of the bladder we have seen ureters of enormous size. In a few cases the ureters were as large as an adult's finger. In some instances these were not transplanted at the time of the first operation but the ureteral orifice was slit at the base of the bladder allowing a freer flow of urine. The patients were operated on again in a few months at which time the ureters were found to be diminished considerably in size and were successfully transplanted into the sigmoid.

According to Englemann's study of the ureters their musculature is composed of an external circular coat and an internal longitudinal coat. By contraction of these muscular layers the urine is carried along from the pelvis of the kidney to the bladder. The contractions occur at rhythmic intervals of from ten to twenty seconds the wave begins at the kidney and passes downward. If the outlet of the ureters were partially obstructed the constant ureteral movements would be causative factors in the distention or dilatation of the ureters such as was noticed in some of our cases.

The earlier methods resorted to for correction of exstrophy of the bladder consisted of various types of plastic operations. These were never successful mainly for two reasons: (1) It was almost impossible to close this abnormal rudimentary bladder; (2) if success were met with in closing the bladder there still was the impaired nervous mechanism of micturition and often sepsis set in and the patients died.

After most dismal failure in reconstruction operations for this condition certain surgeons attempted to implant the ureters into the intestine. This met with success in only a small percentage of cases chiefly because the ureters were implanted into the intestine after the fashion of the Witzel type of enterostomy or gastrostomy. In this method a tube is placed directly in the lumen of the viscus and the wall of the stomach or of the intestine are then sutured over the tube. The transplantation of ureters by this scheme is not satisfactory. The placing of the ureter directly into the lumen of the bowel frequently caused leakage from the bowel from the ureter or from both. Moreover if the wall of the bowel were stitched firmly over the ureter obstruction to the urinary outflow occurred and caused hydronephrosis; this was followed by infection and death unless the pelvis of the kidney was drained and drainage frequently established a permanent urinary fistula. If the tube was stiff to avoid kinking gas was forced upward from the intestine and the result was chronic infection of the kidney and distention of the ureter and renal pelvis.

Coffey in 1911 called attention to the fact that the common

bile duct the salivary ducts and the ureters pass through the muscularis and continue for some distance between the muscle and the mucous membrane before entering the lumen or cavity at which they terminate. Since this discovery a method of ureteral transplantation has been employed in which the ureter is led between the muscle and mucous membrane before entering the lumen of the bowel. The results have been uniformly encouraging. Tension closes the ureter by compression without obstructing its own peristalsis.

In 1926 Mayo and Hendricks published a report of the technic of ureteral transplantation which had been used successfully in a large number of cases during the preceding fifteen years. In the last three years this method has been somewhat modified; it is less difficult and we think it offers some improvement over the method previously described.

By this modification ureteral transplantation into the sigmoid colon has been done without fatality in fifteen cases of exstrophy of the bladder. The ureters have not been transplanted simultaneously in any case. Coffey transplants both ureters at the same time and he is encouraged by his results. We have felt that in most cases implantation of the ureter into the sigmoid is followed by pyelitis, although this is not severe; it has seemed wise to us to transplant one ureter at a time. Thus one kidney is left to function as it had been functioning until the other kidney and the colon can adjust themselves to the new position of the ureter; moreover the time of operation is lessened. We believe that following the transplantation of the first ureter the colon absorbs the urine for a few days; that afterward absorption does not occur and that when the other ureter is transplanted little if any absorption takes place.

### TECHNIC OF OPERATION

An entirely satisfactory method of treatment of exstrophy of the bladder was not obtained until the ureters were transplanted into the sigmoid and the bladder subsequently was removed. This type of treatment as carried out by us has proved entirely satisfactory in a large number of cases. The operation is per-



formed in three stages. The right ureter is transplanted first. Ten days later the left ureter is transplanted and after an interval of about a week the bladder is removed. If the left ureter is transplanted first the sigmoid becomes fixed in the left iliac fossa making transplantation of the right ureter more difficult. It has been the experience at The Mayo Clinic that transplantation of both ureters simultaneously is not a satisfactory method.

The method we now use consists in isolating the right ureter from its normal retroperitoneal position. The ureter is cut off near the bladder and ligated; the end distal to the cut is withdrawn later at the time when the bladder is removed. The opening in the peritoneum is then closed. Next four or five small horizontal niches are made through the serosa and muscular coats of the sigmoid, a segment of which has been isolated and held in position by means of curved rubber covered clamps. With small forceps the serosa and muscular coats are tunneled just outside the mucosa from one niche to another. Through this interparietal tunnel a piece of catgut suture is passed and the upper end of the suture is stitched firmly into the end of the ureter. Before the ureter is inserted into the bowel the loose end of the catgut is passed about 6 cm. into its lumen to permit urine to trickle along the ureter even if it should be compressed and kinked.

Then the ureter is drawn through the tunnels by traction on the catgut. At the lowest opening a small opening is made in the mucous membrane of the sigmoid. The end of the ureter is placed in this opening and a curved needle is slipped over the free end of the catgut which previously was attached to the ureter. The needle is passed through the opening into the lumen of the sigmoid and out through the entire thickness of the wall of the sigmoid about 1 to 1.5 cm. below the insertion, drawing the ureter within the lumen of the bowel. This stitch holds the ureter in place. Several interrupted sutures are used which include the serosa and a small portion of the ureteral wall at the points where the small openings in the peritoneum and muscle previously were made. By means of a second row of sutures the

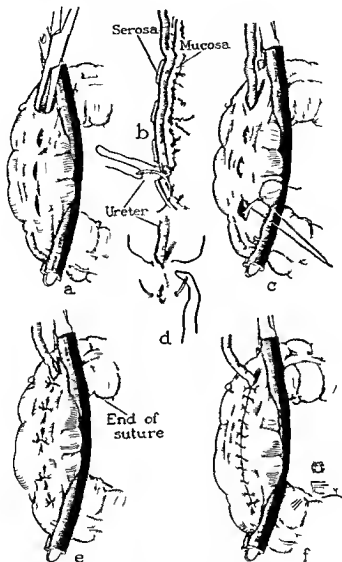


FIG 1—Method of transplantation of the ureter into the sigmoid colon

Isolation of segment of sigmoid series of small horizontal niches through serosa and muscular coats and tunnelling from one niche to the other through serosa and muscular coats *b* ureter pulled through tunnel by traction on catgut. An opening in the mucosa has been made. The needle that threaded over the piece of catgut passes into the lumen of the sigmoid and out through its walls *c* another view of substantially the same steps as those shown in *b* *d* and *e* interrupted suture which includes serosa and a small portion of the ureteral wall at point *x* where niches were made for second row of sutures over the primary suture line

serosa is approximated over the primary suture line. The ureter must not be compressed in the tunnels or by the sutures. The sigmoid is then rotated outward until the suture line is in contact with the iliac peritoneum and it is held there by a few interrupted sutures. The abdomen is closed without drainage.

In a few days the left ureter is transplanted after a similar fashion. About one week after the second stage the bladder is dissected out leaving a rather large raw surface which heals by granulation rather rapidly except usually for two or three small pin point areas which mark the sites of the seminal vesicles.

### SUMMARY

Transplantation of the ureters in exstrophy of the bladder is the most satisfactory treatment for this condition. More particularly has this been true since Coffey's suggestion has been followed namely that the ureter be passed for some distance between the muscular layers before it should be implanted into the lumen of the bowel.

Exstrophy of the bladder although rare is probably quite frequently unrecognized as other than a congenital deformity of undetermined nature. At The Mayo Clinic more than 100 cases have been seen since 1901.

Before ureteral transplantation is made it is necessary to make certain that the sphincters of the anus are functioning normally. If control of this mechanism is lacking little is accomplished by adding urine to the intestinal content.

The operation is best done in children aged more than three years. By that age children are able to attend to their own toilet. However under certain circumstances we have done several operations for exstrophy in patients younger than three years.

We believe it is best to do the operation in three stages transplanting the right ureter first. After an interval of ten to twelve days the left ureter is transplanted. Usually in one week after the second transplantation the bladder can be removed.

In most cases pyelitis develops temporarily and there is a rise in temperature of from 1 to 3 degrees lasting from a few days to a week. For a short time when the ureter is first transplanted the colon absorbs some of the salt urine.

# VESICOSIGMOIDAL FISTULA GASTRO INTESTINAL HEMORRHAGE IN A CASE OF APPENDICITIS AND IN A CASE OF CHRONIC CHOLECYSTITIS WITH CHOLELITHIASIS EXCISION OF GASTRIC ULCER AND POSTERIOR GASTRO ENTEROSTOMY LESIONS OF THE KIDNEYS

E STARR JUDD JAMES M MARSHALL AND SHATTUCK W HARTWELL

## VESICOSIGMOIDAL FISTULA

Case I—A married woman aged seventy seven years was admitted to the clinic August 23 1929 Ten years previously she had had an ischio rectal abscess that had spontaneously drained externally and had healed Otherwise the medical history was essentially negative A year previous to admission she had begun to have pain in the region of the bladder frequency urgency and burning on urination and she had noticed the passage of fecal material in the urine These symptoms gradually had become more severe until at the time of admission she was voiding every fifteen to thirty minute Her general health had markedly declined during the year and there had been loss of weight of 30 pounds

The patient was emaciated and weak but otherwise in fair general condition for her age On bimanual examination considerable thickening and fixation of tissues was palpable high in the posterior vaginal vault The urine the bladder contained much pus and a few erythrocytes but the urine from each kidney was clear The concentration of hemoglobin was 60 percent erythrocyte numbered 3 900 000 and the leukocyte 8 600 for each cubic millimeter of blood Cystoscopic examination revealed marked chronic areolar cystitis A functional test of each kidney separately disclosed a normally functioning kidney on each side Proctoscopic examination for a distance of 18 cm within the bowel gave negative result Roentgenologic examination of the colon was not made

Exploration August 28 1929 revealed a hard firm mass in the sigmoid portion of the colon firmly adherent to the posterior wall of the urinary bladder On separating the sigmoid portion of the colon from the bladder it was found that there was a communicating opening between them about 1 cm in diameter The edges of the opening in the bladder were freshened the hole was closed with plain catgut and the peritoneum was sutured over it The lesion in the sigmoid seemed definitely to be diverticulitis but it seemed unlikely that an intra abdominal closure of the perforation could be made to hold Therefore the lesion was brought out through the abdominal wall as the first stage of a Mikulicz operation on for resection of the colon and a catheter was introduced into the perforation to make a temporary colostomy opening A

c t cath t w l ft th bl dd A week l t th co d t g  
w d wh h th l w r m d Th p th l g t pot d m l  
t pl d t l w th pe d t l t  
C val se f m th pe t w som h t l w b t th r w se  
t f l Th t t cath t w em d f m th bl dde th  
l th d y d th p t t w ll w d t d Th w n d bl  
t b l ty f th bl dd w th m k d f q cy t f t b t th g d lly  
b dd t l th p t t l d h d th w th com f t f th h s  
Th p t t w ll w d t g t p d bo t d t ga h t g th  
Cl mp ppl d t the p t t bet th t d f th d  
l p f b w l N mbe 5 d th l t my pe g d f l  
wh th p t w w t t

C s II—A phy g d filty f y wa dm t t l t th l  
O t t 8 t 9 9 m pl g f t b l ty f th bl dd d th p sag  
f f l m t l f r m th th Th m t m l cal h t y w  
t lly g t p t f d ph th a 1910 d h m h d t my  
d p f l f t l th sam y f 1925 h had h d t t k  
f y t t th h l l f g l m l d t m t b l ty f th  
ry bl dd w th f q y g y d th p sag f g f m th  
th f l l g t Th t t k h d l t d g h t w k d g  
wh h t m th h d t m l pa th H h d th b w l  
f t y t l J ry 1927 wh h h d h l m l t k F l  
l g th h h d b m t t d t b d m l p l t It w r pot d  
h t d h t m cat b t w th bo l d bl dde h d t h  
t d b t th t m y dh h d b b k p th t g a F l  
l g th p t h h d m d t f y w l l f t w d h l f v  
Th A gu t 199 f l l w g th g t f cal m l h h d h d t t k  
m l t th f t b t th t m h h d p s e d f c by th th Th  
t t k h d t d f m f e w k d th h h d b m t t d  
t pe l p t t t m p t t l cat th t r bl b t f t l h d  
t b h d D g th d g f w k l l y m p t m h d  
b d l d h h d m t th l f m t Du g th se  
f th l l h g l h k h h d ma d g d p t d o g th x a b  
t H h d t l t w g h t d h d h d d f t g t t t l  
v m p t m  
C l x a m t g t lly g t l t Th f  
th bl dd t d d bl p t w n ty f l l t th h g h p w  
f l d Th t t f h m g l b d th l t d p c t  
m l Th W m t f t b l l w g t d t l  
t t f b l d m al R t g l g c t d o f th th a k d y  
t d l g g t t P t scop m t f  
d t f 4 m g b t l t O y t p exa t  
t l t bl dd w f d t t b l t d d m d t l v t t  
p t Th w m l f t f m th r k d y A v t g m  
mad wh h d d d m m t b t w th l f t p p e p t  
p t f th w l l f th bl add d th g m d p t f th col (F g )  
B th u t f d t l d

Exploration through a low median line incision revealed old diverticulitis of the sigmoid with apparently a perforation between a single diverticulum and the posterior wall of the bladder. There were many adhesions and considerable scar tissue in this region. The sigmoid colon was dissected off from the bladder; the opening (5 mm in diameter) was closed with chromic catgut and silk. The opening in the bladder was closed with a continuous suture of chromic catgut. Two small split tube drains were used and a retention catheter was left in the bladder.

The catheter was removed on the seventh day and the drains were removed on the eighth and ninth days. At first the patient voided about every hour but the interval gradually lengthened and on the twenty-first



FIG. 2 (Case 11) —The opaque medium is shown escaping from the bladder and into the sigmoid.

postoperative day he could remain in comfort for four hours. The abdominal wound healed and he left the hospital in good condition on the twenty-first day.

*Comment* —These cases often are difficult to diagnose unless the opening between the bowel and the bladder is large enough to allow a considerable amount of feces to escape into the bladder or a perceptible amount of urine to escape into the colon. Frequently the opening is so small that it is hard to demonstrate and the result is extensive cystitis with a colon bacillus

t t cath t w l ft th bl dd A w k l t th second t g  
w d wh h th l w m d Th p th l g t pot d m l  
t pl d t l w th p e d r t cult  
C al f m th p e t w som wh t l w l t th r w se  
t f l Th t t cath t w m d f om th bl dd th  
l th d y d th pat t w ll w d t r d Th wa d bl  
t b l t y of th bl dd w th m k d f q c y t f i t b t th gr d lly  
b d d u t l th p t t l d h l d the w th com f t f th h u  
Th p t t w ll w d t g t p d bo t d to g h t g th  
Cl mp w p p l e d t th p t t b t th tw d f th se d  
l p f bow l N m b e 5 d th l t my p e g d f l  
wh th pot w w t t

C II—A phy g d fifty f w adm t t d t th l c  
O t b 8 1929 compl n g f t b l t y f th bl dd d th p sag  
f f l m t a l f m th th Th m t m d cal h t y s-  
se t lly eg t p t f d ph th 1910 d h m r r h l t my  
d p f l f t l th sam y l 19 5 h h d h d t t k  
f y t t w t l h l f g l m a l se d t e m t b l t y f th  
r y bl dd w th f q y u g y d th p sag f g f m th  
th f l l w g to Th t t c k h d l t d g h t w k d g  
wh h t m th h d b e m h p th H h d th b e e w l l  
f t t l J r y 19 7 wh h h d h d m l t t k F l  
l g th h h d b m t t d t h d m l p l t l t w port d  
t t d f t m eat b t th bow l d bl dd h d t b e  
f l b t th t m a y d h h d b b k p th t g F l  
l w g th p e t h h d d t l y w l l f tw d h l f y  
Th A g t 1929 f l l w g th g t f cal m l h h d h d t t k  
m l t th h c b t th t m h h d p s e d f l y th th Th  
t t k h d t d f m f w k d th h h d t m t t d  
t p e l p e t a t t m p t l cat th t b l b t f i t l h d  
t b e h d D g th d g f u w k l l v m p t m h d  
b d d d h h d m t th l f x a m t D g th  
f th l l h g l h l th h d m a d g d p t d g th b  
t H h d t l t w g h t d h d h d d f i t g t t t l  
v m p t m

Ge l m t g t lly g t l t Th u f m  
th bl dd t d d bl p tw t y f l l t th h g h p w  
f l d Th t t f h m g l b d th bl l p t w  
m l Th W s e m e t f th bl d w g t d th  
t t f blood m a l R t g l g t d f th th k d  
t l l g g t l t P t p m t f  
d t f 4 m g n g t l t O y t s e p x a m t  
t l t bl dd w f d t w t b l t d d m d e t l c y t t  
p s e t Th w m l f t f m th k d y A c y t g r  
w m a d wh h d s c l d m m t b t w th l f t u p p t  
p t f th w l l f th bl dd d th g m d p t f th col (F g 2)  
B th t f d t l d

and had been temporarily relieved by movement of the bowels. There had been no nausea or vomiting and no constipation.

The patient was in a good state of nutrition although her weight was 10 or 12 pounds less than usual. The systolic pressure was 110 and the diastolic 80 measured in millimeters of mercury. The temperature was normal. On examination the abdomen was held slightly rigid in the right lower quadrant and the cecum was palpable. Concentration of hemoglobin was 66 per cent, erythrocytes numbered 4 050 000 and leukocytes 7 600 in each cubic millimeter of blood. The result of the differential leukocyte count was normal. Analysis of gastric content disclosed total acidity of 50 and free hydrochloric acid of 30 based on 100 c.c. of gastric content and expressed in terms of tenth normal solution of sodium hydroxide. Roentgenologic studies of the thorax, stomach, duodenum and colon were negative. Proctoscopic examination of 24 cm. of the colon gave negative result. Repeated examinations of the stools disclosed only the presence of *Chilomastix mesnili*. Abdominal exploration was decided on.

Abdominal exploration was done July 22, 1929. Thorough examination of the stomach, duodenum, jejunum, ileum and colon gave negative results. The gallbladder seemed normal. The appendix was definitely inflamed and there were a few adhesions around the cecum. These adhesions were broken up and appendectomy was done. The pathologist reported chronic catarrhal appendicitis with fibrosis of the tip of the appendix.

Convalescence was uneventful and the patient left the hospital on the eleventh day. In a recent communication four months after the operation she stated that she had remained well with no recurrence of the symptoms.

**Case IV**—A physician aged fifty-one years was admitted to the clinic September 9, 1929. He had had typhoid fever in 1906 and scarlet fever in 1922. He had also undergone thyroidectomy for an adenomatous thyroid gland in 1905 and bilateral repair of inguinal hernia and appendectomy in 1925. His complaint on admission was of recurring gastro-intestinal hemorrhage. In September 1927 he had had a sudden attack of melena with weakness, giddiness and the passage of several tarry stools. Concentration of hemoglobin had been below 50 per cent after this attack. Five weeks later he had had a similar attack and had been in bed for six weeks during all of which time the stools had contained occult blood. Recovery then had ensued and he had remained in good health until April 1929 when he had had a recurrence of the melena and had been in bed for ten days. Again August 10, 1928 the hemorrhage had been repeated. During the course of this illness his general health had remained fairly good and he never had had any associated dyspepsia, nausea, vomiting or pain.

The patient was moderately obese. The systolic blood pressure was 160 and the diastolic 85. The pulse rate for each minute was 80 and the temperature was normal. General examination of the abdomen was negative except for the three healed lower abdominal wounds. Examination of the urine and the Wassermann reaction of the blood gave negative results. The concentration of hemoglobin was 1.6 gm. for each 100 c.c. of blood, the erythrocytes numbered 4 500 000 and the leukocytes 4 700 for each cubic



m l l m t f b l d d t h d f t l c t w g t A l y f  
 g t c t e t d l s e d t t l d t y o f 0 d f h y d h l a d o f 52  
 R t g l g t d f t h t h t m a h d d m d c l o g  
 g t l t Th b l c y t g r m g d e n f f c t g  
 g l l b l d d  
 E p l t w d S p t m b e 16 1929 t h g h a p p e g h t  
 t c E p t f l g h l d d t t h t g t o t t l  
 t t m d m l Th l w m w h t l g t h m a l b t t h  
 w d f h Th g l l b l d d d f t l y f l m d d  
 t h y t d t t d t Th l y g g t f t b d m l  
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*Comment*—Recurring gastro intestinal hemorrhage often presents a difficult problem for the clinician and for the surgeon. The condition is not uncommon. Sometimes it is impossible to find a lesion in the stomach or duodenum that would account for the hemorrhage. On some occasions the bleeding results from a polyp in the small intestine or from a malignant condition colitis or a polyp in the colon. Undoubtedly in some instances changes in the blood are responsible and the bleeding is not due to any lesion in the gastro intestinal tract. Cirrhosis of the liver with varices about the esophagus must also be borne in mind. Some disturbance in the spleen such as Banti's disease may be responsible for the hemorrhage. Ulcers in the gastro intestinal tract may be the cause so the duodenum should always be investigated even in the presence of a negative roentgenologic examination.

We have observed a series of cases in which operation has been done because of recurring gastro intestinal hemorrhage but in which we were unable to find any lesion in the gastro intestinal tract. Of course this does not mean that some small lesion did not exist there but there was none of sufficient size to be recognized by the surgeon. However in some cases we found

definite inflammation of the gallbladder and in each case the gallbladder contained stones. By removing the gallbladder and usually the appendix also we have seemingly produced some change so that in this series at any rate bleeding has ceased. We know that removal of the gallbladder does produce remote changes which are not well understood. Furthermore we have ample evidence of the influence of the liver on some of the factors involved in the coagulation of the blood. It is possible then that in some instances recurring gastro intestinal hemorrhage may result from chronic cholecystitis with its remote changes. Case IV is one which we believe falls into this group. In this case there was gastro intestinal bleeding for which we were unable to account. However there was an area in the duodenum which was suggestive of a little inflammation. We know that severe bleeding may occur in cases of duodenitis even when it is difficult or impossible to demonstrate the presence of an ulcer. We believe that duodenitis may be associated with chronic cholecystitis and hepatitis. In Case IV the only evidence of disease that we could find on complete exploration of the gastro intestinal tract liver pancreas and spleen was chronic hepatitis with definite cholecystitis. Case III is one in which there had been repeated hemorrhages but we were unable to demonstrate any trouble in the gastro intestinal tract liver or gallbladder. There was definite inflammation in the appendix. We have not often felt that inflammation in the appendix could be the cause of gastro intestinal hemorrhage and in this case it is possible that we have not analyzed the condition correctly. However something seems to have been accomplished by removal of the appendix of this patient because her general condition has improved. It is possible that this chronic infection may have been responsible for all of her difficulty.

Munn and Bollman recently reported their observations of the influence of complete removal of the liver on the factors concerned in coagulation of the blood. They summarized their results as follows. Following hepatectomy there is no appreciable change in the calcium content of the blood or in the prothrombin content of the blood. Fibrinogen is not altered by

the process of hepatectomy and may remain normal in the blood for a great many hours after hepatectomy. When the fibrinogen is depleted there is absence of regeneration in the absence of the liver. Antithrombin may increase in the absence of the liver and may also decrease in the absence of the liver.

Some of the functions of the liver undoubtedly are important factors in coagulation of the blood and it may be that in the group of cases under consideration removal of the gallbladder brings about some changes which compensate for or which readjust the disturbed function.

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*Comment*—Gastric ulcer occurs both as a benign and as a malignant lesion. An important point to be considered in dealing with a gastric ulcer is that it is impossible to tell whether it is benign or malignant until it has been excised and examined microscopically. There are no clinical or roentgenologic signs or any gross features that will enable us to be sure into which group the ulcer falls. For that reason gastric ulcer is always a surgical condition and the procedure should be such that it will get rid of the ulcer either by excision or by resection.

Undoubtedly many gastric ulcers have healed of their own accord. Some have been made to heal by proper diet and management and others have healed as a result of gastro enterostomy. It is equally true however that in some cases in which the patients have been subjected to this conservative treatment the condition has progressed from an operable state to an extensive inoperable malignant condition while the treatment was being carried out. A surgeon may be able to speculate with a fair degree of accuracy as to whether the lesion is benign or malignant but he cannot be certain of its nature until microscopic study has been made.

Gastro enterostomy alone is not a suitable procedure for the treatment of gastric ulcer even when the lesion is benign for experience shows that in many cases the symptoms have persisted and that the lesion has increased rather than decreased. Resection of the stomach is the procedure most frequently carried out at the present time but it seems to us that this is not indicated when the lesion is small and can be excised without too much resultant deformity of the stomach. Excision of gastric ulcer combined with gastro enterostomy has given better results than almost any other operative procedure for this condition.

In case V the operation was carried out in such a way that the greater part of the lesser curvature of the stomach as well as the ulcer was removed. This plan results in wide removal of the lesion which is a safeguard in case it proves to be malignant. Then also excision of most of the lesser curvature prevents recurrence of the ulcer which is not uncommon following



Exploration through a lumbar incision August 26, 1929, revealed a tumor in the lower pole of the right kidney approximately 10 cm in diameter. Right nephrectomy was done; the ureter was ligated and was dropped back into its place.

Examination of the removed kidney revealed a rounded, encapsulated tumor in the lower half of the kidney measuring 10, 10 and 10 cm in various diameters (Fig. 4). Microscopic examination revealed a low grade carcinoma with an adenoma. The specimen weighed 435 gm.

Convalescence was uneventful. The patient was dismissed on the twenty-first postoperative day with the wound healed in good general condition.



FIG. 3 (Case VI).—Shadow of the soft tissue and the extent of the renal pelvis and calices.

*Comment.*—Adenoma of the kidney is common. It is most frequently found at necropsy, as the lesion ordinarily is too small to be recognized during life and usually it does not produce symptoms.

In the course of the last few years cases of adenoma of the kidney have been reported by us and a complete review was published recently by Kretschmer.

Most of the adenomas of the kidney that we have seen have been definitely benign a few have been of sufficient size to produce symptoms The case here reported is of particular interest because in the first place the lesion was of such a size that it could be felt easily and could be recognized as a tumor of the right kidney The feel was more like that of a hypernephroma in a movable kidney and we rather suspected before operation that it might be a hypernephroma The case also calls attention

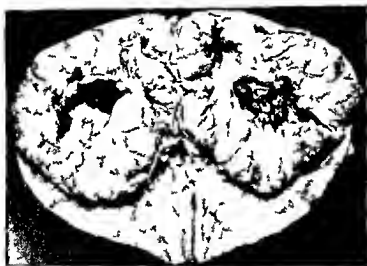


FIG. 4 (C. VI)—The kidney presented a large growth more like a hypernephroma than an adenoma.

to the fact that adenoma of the kidney may develop into a large tumor and that the lesion may be malignant

C. VII—Large affected kidney with hydronephrosis the bladder was enlarged—A boy aged 5 years presented a large growth of the right kidney. The growth was of the size of a large orange and was of a firm, fleshy consistency. It was found to be a large adenoma of the kidney. The patient was operated upon and the tumor was removed. The patient recovered well.

operation as performed. The appendix was a 1 to have been normal but a large fluctuating cystic retroperitoneal mass had been encountered. This had been drained of a considerable quantity of fluid that had looked like urine. The abdominal wound had healed promptly and the patient had made a good recovery and had remained in good health until two weeks before his admission to the clinic. At this time he had had a recurrence of fever and of pain in the right side of the abdomen. His mother had thought she could feel a mass in the right upper part of the abdomen.

The boy as well nourished. The entire right side of the abdomen beneath a healed lower right rectus scar was held rigid on examination but a definite mass was not palpable. The temperature was 100° F on admission and ranged between 99.2° and 102° F during the ten days observation in the hospital. The urine at times was almost clear and at other times was loaded with pus. From both kidneys taken together there was 80 per cent return of phenolsulphonephthalein in twelve hours. Roentgenograms of the thorax, kidneys, ureters and bladder gave negative result. A pyelogram of the right kidney showed that the ureter was filled in its lower third but only was irregular and was slightly dilated. There was a faint shadow in the upper part of the ureter leading to a faint area of medullary shadow of the right kidney. The urine from the left kidney was clear and the function of the kidney was normal. A diagnosis was made of a functional infected right kidney and hydronephrosis.

Exploration revealed a large infected kidney with hydronephrosis and complete destruction of the kidney. The pelvis and calices were dilated and the cortex was thinned to a mere shell. The specimen weighed 200 gm. Nephrectomy was done.

Convalescence a uneventful. The patient was out of bed on the eighth day and went home on the fifteenth day. The wound healed in good general condition.

*Comment*—Various theories have been advanced to explain unilateral hydronephrosis seen in infants and children. Most present day authorities favor the belief that it is due to some mechanical obstruction caused by a congenital defect. Many cases have been reported in which anomalous vessels crossing the ureteropelvic juncture were the apparent cause of the obstruction. Others have demonstrated ureteral kinks, defective ureterovesical relationships and cases in which the ureteropelvic juncture seemed badly situated for adequate drainage of the renal pelvis. The causative factor in many of these cases is not definitely found even at operation. Some have explained these cases on the basis of congenital atony of the renal pelvis and ureter. They must not be confused with bilateral hydro-ureteral angularity with hydronephrosis recently studied by





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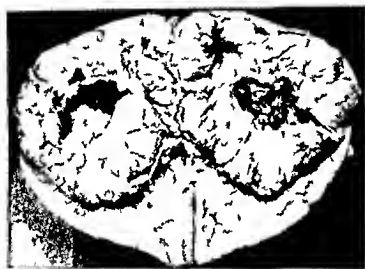
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to the fact that adenoma of the kidney may develop into a large tumor and that the lesion may be malignant.

Cas. VII—Large adenoma of kidney with hydronephrosis that probably was congenital. At 5 years of age was operated on for the first time. The tumor was removed and the kidney was found to be normal. The patient was followed up for several months and the kidney remained normal. The patient was operated on again at 10 years of age for a second time. The tumor was removed and the kidney was found to be normal. The patient was followed up for several months and the kidney remained normal. The patient was operated on again at 15 years of age for a third time. The tumor was removed and the kidney was found to be normal. The patient was followed up for several months and the kidney remained normal.

the creatinine 4.4 mg. The return of phenolsulphonephthalein was 15 per cent in 10 hours. The patient was observed during a severe chill after admission following which the temperature rose to 105.5 F. There were no localizing symptoms except slight pain in the left upper part of the abdomen. Blood culture gave negative results and bacilli of tuberculosis could not be found in the urine. A diagnosis of chronic glomerulonephritis with cortical abscess was made. Fluids given intravenously and medical treatment of the renal insufficiency did not have any effect and operation was undertaken without delay.

The exploration of the kidney was carried out through a left lumbar incision. There was no perirenal infection but the cortex was riddled with small abscess cysts of the type described by Brewer. Nephrectomy was done.

The kidney weighed 85 gm. and it was estimated that 95 per cent of it was destroyed. There were numerous small abscesses in the cortical portion of the kidney ranging from microscopic size up to 4 mm in diameter. There was a small region of tuberculosis in the lower pole of the kidney measuring 5 mm in diameter. The kidney also showed the typical gross and microscopic change seen in chronic glomerulonephritis.

There was complete relief from the chills and fever. The blood urea rose slightly to 163 mg and the creatinine to 8.2 mg in each 100 cc of blood. Physiologic solution of sodium chloride was given intravenously daily and the patient was given a diet low in protein. She improved steadily gained weight and left the hospital on the eighteenth postoperative day. At the time of dismissal the blood urea was 84 mg. In a recent letter she reported that she had felt fairly well since leaving the hospital and that she had remained free from chills and fever. She had been able to do her own housework but had had some headache and fatigue and she is probably still suffering from some degree of impairment of renal function.

*Comment*—Brewer more than twenty years ago demonstrated clearly by experimental and clinical studies the hematogenous origin of cortical abscess of the kidney. He demonstrated the embolic origin of pyogenic organisms in the capillaries of the renal cortex with the formation of small abscesses which if the patient does not succumb to the infection or if it is not treated surgically spreads by extension necrosis and terminates either by eroding into the renal pelvis with the production of pyelonephritis or by breaking through the cortex forming a perinephritic abscess. He and others have emphasized the occurrence of such a complication in the course of the bacteremia associated with many of the infections such as furuncles carbuncles paronychia acute tonsillitis typhoid fever septicopyemia and chronic foci in the teeth or tonsils. Brewer Israel W J Mayo

and others have laid stress on the increased susceptibility to such infection of a kidney previously injured by direct trauma the presence of stone hydronephrosis or other chronic disease. The affection is commonly unilateral or if bilateral the predominant lesion is unilateral. Surgical intervention offers the best and often the only means of cure. Nephrectomy is usually required but certain of the milder cases have been successfully treated by incision and drainage especially if the abscess is single.

In Case VIII the parent focus of infection was not definitely determined but might have been an apical abscess at the root of a tooth. Two such abscesses in this case were diagnosed by dental roentgenogram. The kidney affected had been definitely exposed to direct trauma four months previously and was already the seat of chronic glomerulonephritis. There was therefore an excellent medium for the lodgment and growth of bacterial emboli. In this case the classic symptoms of recurring chill and fever the slight but definite pain in the region of the left kidney the rapid decline in the patient's general condition and the presence of definite tenderness in the left costovertebral angle were strongly suggestive of cortical abscess. The abnormal constituents of the urine were not marked probably because none of the abscesses communicated with the renal pelvis. Because of the rapid decline in the condition of the patient operation was promptly undertaken in spite of the extreme risk from the renal insufficiency. Our judgment was vindicated when the excised kidney was found to be almost completely destroyed and therefore functionless. Renal function had rested entirely with the opposite kidney and no doubt was considerably impaired by the presence of the infected kidney. The very small area of tuberculosis was found incidentally and we could discover no evidence of any other focus of tuberculosis.

# UNUSUAL TUMORS OF THE GASTRO INTESTINAL TRACT

DONALD C. BALFOUR AND ARCHIBALD H. MCINDOE

## REPORT OF CASES

**Case I Benign tumors of the stomach**—A man aged seventy-two years came to the clinic in September 1929. Ten months previously he had begun to have an uneasy rumbling sensation in the right lower abdominal quadrant particularly in the morning. This gradually became worse but was not accompanied by pain. He began to lose weight (20 pounds) although his appetite remained fair and the bowel regular. Although the stools were occasionally very dark definite melena was not present. Vomiting had occurred on three occasions. Increasing weakness was the most marked feature of the complaint.

The patient weighed 144 pounds. The abdomen was slightly resistant in the epigastrium but masses could not be felt. Benign hypertrophy of the prostate gland graded 2 and generalized arteriosclerosis graded 2 were noted. There was 30 cc of residual urine. The erythrocytes numbered 3,600,000 and the leukocytes 6,300 for each cubic millimeter. The hemoglobin was 45 per cent. Analyses of the gastric content showed total acidity of 20 but free hydrochloric acid was absent in all fractions. A faint trace of blood was present. Roentgenologic examination of the stomach revealed a polypoid tumor at the pylorus probably benign but possibly carcinomatous (Fig. 1).

Under the line anesthesia the abdomen was explored and a mass was found on the posterior wall at the pyloric end of the stomach. On opening through the anterior wall the mass proved to consist of two papillomas about 1 cm. in diameter attached to pedicles 3 cm. long on the posterior wall just above the pylorus near the lesser curvature. The growths were excised with the cautery, the mucosal defect was repaired and the incision was closed transperitoneally.

Pathologic examination of the tumors showed them to be benign pedunculated adenomatous polyps.

Benign tumors of the stomach are relatively rare. The actual proportion of benign tumors to malignant tumors and ulcerations is as 1:200. They form 1.3 per cent of all gastric tumors. A wide variety of histologic types was found in the twenty-seven cases reported from The Mayo Clinic by Eusterman and Senty and in the series of fifty-eight cases reported

by Balfour and Henderson. The adenomatous and fibro-adenomatous polyp, fibroma, myoma, hemangiomas, dermoid cysts, papilloma, and polypoid masses were all represented. Exclusive of gastric polyps, a pedunculated polyp of which this case is an example was found fourteen times. Nine were single and five were multiple. The highest number encountered in one case was twelve. They varied in size from 6 mm in diameter to 8 cm long and 2 cm wide. Usually they were



FIG. 5. Polypoid mass of the pyloric region.

situated at or near the pylorus or on the posterior wall and occasionally, as in this instance, they were so placed that prolapse through the pylorus with obstructive symptoms resulted. This ball valve action was illustrated by Gibson, who described a benign polyp just inside the pylorus which produced intermittent obstruction. Wade cited an example of intussusception and duodenum caused by a benign pedunculated

75 per cent of these cases symptom of

pyloric obstruction are present. Hemorrhage from ulceration of the polyp is a more common complication and may be severe. In five of the fourteen cases it was marked and in three the condition of the blood was suggestive of pernicious anemia. In all of these cases the blood picture returned to normal after the removal of the polyps. Another interesting observation in all cases of polyps uncomplicated by other gastric lesions and in the case reported here is the absence of free hydrochloric acid from the gastric contents. This further tended to obscure the differential diagnosis of pernicious anemia, gastric carcinoma and benign tumor. Usually, however, the tumors are relatively symptomless and when small and not eroded, not too near the pylorus and not associated with other lesions, are rarely diagnosed clinically, unless by roentgenologic examination.

Roentgenologically the picture is more suggestive than diagnostic and with the exception of gastric polyposis with characteristic mottling of the gastric shadow, differentiation of the type of tumor is not possible. Moore stated that in general benign tumors produce a circumscribed and punched out filling defect usually on the gastric walls leaving the curvatures regular and pliant. Although the rugae are obliterated from the immediate area of the tumor just as in inflammatory and malignant lesions the rugae surrounding the benign tumor are more nearly normal in arrangement and distribution. Little disturbance in peristalsis is noted nor is there any niche in cisura or any other evidence of spasm.

The potentiality of these small adenomatous polyps for malignant change appears to parallel rather closely the same type of tumor in the colon and rectum (Lockhart Mummery, Dukes and Saint). Thus the pathologic report of one of these polyps approximately 1 cm in diameter situated at the cardiac end of the stomach was suggestive of malignant degeneration. Although the tumor was rather inaccessible it was removed by cautery amputation of the pedicle. Four months later exploration revealed an inoperable carcinoma of the cardiac end of the stomach apparently originating at the site of the tumor.

Another interesting example of this relationship was noted





April 21 an exploratory operation was performed and a tumor was removed from the upper part of the jejunum. The growth was annular measured 6 by 3 cm. and was ulcerating with raised thickened hard irregular edge. The mesenteric lymph nodes were involved. Microscopic study showed a very cellular carcinoma.

The patient was dismissed from the hospital on the twenty fourth day greatly improved. On the second day after operation the patient was very weak and pale the pulse began to rise and was poor in quality. A transfusion of 400 c.c. of blood was given and he improved immediately. Owing to lowered resistance pneumonia developed on the seventh day and ran a course of low fever and slow resolution. The hemoglobin on the day of dismissal was 50 per cent and the patient's strength and weight improved.

The purpose of presenting this case is to draw attention to one of the possible explanations for obscure secondary anemia. This is not the first case of this type which has been seen in the clinic there are records of fifty cases of malignant lesions of the small intestine. Most of these however have been secondary to lesions in the colon or in other regions of the abdomen. Primary carcinoma of the small intestine is rare. It is still more rare that the only symptom presented is anemia and the anemia is particularly remarkable in this case because the hemorrhages extended over such a long period of time. In a review of the history of the case it is found there were gastrointestinal hemorrhages in 1925 1926 and 1927. It is unusual too that a tumor of such size should not be associated with symptoms of obstruction. In a recent case in which operation was performed severe secondary anemia occurred but there was also intermittent obstruction which made diagnosis possible. The possibility that the lesion may be associated with duodenal ulcer as in another case in which operation was performed is a most important point. In such a case the assumption could be that the ulcer had been responsible for the bleeding and the tumor if it were situated at any considerable distance distally in the jejunum could easily be overlooked. The significant point in this case therefore is that when a patient has had repeated gastrointestinal hemorrhages but the results of examination are negative operation should be advised and the possibility of a carcinoma of the small intestine should be kept in mind.

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lesion was considered carcinoma although the possibility of a benign growth was recognized. It seemed best therefore to treat it as the latter and a Witzel type of jejunostomy was performed a number 20 catheter being used. General exploration did not show obvious metastasis. The postoperative convalescence was uneventful and the patient was sent home under dietary management and with instructions as to administration of fluids and nourishment through the jejunostomy tube.

Three months later the patient returned. Ten weeks after discharge during which time she had experienced increasing difficulty in getting sufficient food through the rather small jejunostomy tube she noticed the rapid onset of returning emaciation and soreness of the mouth and tongue.



FIG 7—Regression of the lesion five months after jejunostomy

The tongue was beefy red. Both lips were rough and the knuckles were highly characteristic of secondary pellagra. Gastric analysis that day revealed total acidity of 20 and free hydrochloric acid of 6. Roentgenologic examination of the stomach did not show change in the size of the lesion. The patient was placed on a strict ulcer diet containing beef, vegetable fruit juice and beef juice, the feeling being given through the jejunostomy tube and supplemented by cautious oral administration. Within a week the patient showed marked improvement, the glossitis, rectal pain and dermatitis had disappeared rapidly.

Ten months later (five months after the operation) the patient returned feeling very well with complete disappearance of any signs of malnutrition. She had gained 15 pounds. At this time roentgenograms of the stomach

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 p b b l t y f t h b e g t of the l e s e m d t b e t a b l h d

This case illustrates several important principles in dealing with irremovable lesions of the stomach whether they are benign or malignant. There are in general four procedures applicable when after careful inspection attempts at removal should not be made: (1) Posterior gastro enterostomy, (2) anterior gastro enterostomy, (3) jejunostomy and (4) partial gastric exclusion. For irremovable lesions near the pylorus and definitely on the gastric side partial gastric exclusion by division of the stomach well above the lesion, closure of the pyloric stump and restoration of gastro intestinal continuity by anterior or posterior end to side union of the upper segment and the jejunum is a most useful type of operation. The relief of symptoms in such cases is complete and if the lesion is not malignant the relief is usually permanent. If the lesion is malignant the procedure offers almost certain protection against obstruction with the further possibility of later removal of the pyloric segment along with the lesion as a two stage maneuver. For irremovable lesions of the body of the stomach usually on the posterior wall anterior gastro enterostomy is the method of choice since satisfactory posterior anastomosis is almost certain to be difficult. Here too subsidence of inflammatory change in and about the lesion may make secondary resection possible. When the tumor is situated in the fundus the choice lies between gastro enterostomy and jejunostomy. When carcinoma is certain the former is preferable as an ample amount of stomach can be mobilized below the lesion to permit satisfactory anastomosis. Even though it has been stated that gastro enterostomy should be performed proximal to the lesion considerable relief may be given when this is not possible. In younger patients and when it appears probable that the lesion is benign jejunostomy offers a good prospect for healing. In a number of cases complete disappearance of the ulcer has been observed following the rest afforded the stomach by a few weeks of feeding through a jejunostomy tube. Periodic roentgenologic examination will de-

termine the improvement of the lesion and the optimal time for the removal of the tube. In this instance clinical and roentgenologic data were strongly in favor of carcinoma but without exploration there appeared sufficient evidence to suggest the possible inflammatory nature of the mass. Accordingly jejunostomy was performed and was followed by marked reduction in the size of the lesion on subsequent roentgenologic examination. The development of avitaminosis or secondary pellagra during the period of feeding through the tube can be traced to the fact that the tube was too small in caliber to permit satisfactory handling by the patient herself. She stated that to maintain its patency the food had to be strained through several thicknesses of gauze and was so dilute that little was left but the water and the odor. Within three months symmetric dermatitis, glossitis and diarrhea developed characteristic of secondary pellagra. The patient was however promptly relieved by the administration of suitable foods containing the necessary vitamin B. Striking clinical improvement then occurred.

Roth in 1916 and Bryan in 1919 reported the first instances of pellagra secondary to lesions of the stomach interfering with nutrition and Bender in 1925 called attention to it again. O'Leary reviewed five similar cases in the clinic and concluded that the obstructive lesion plays essentially a mechanical part in that it prevents the ingestion of sufficient food or food containing enough vitamins. He found it in cases in which there was malfunctioning gastroenteric stoma, gastric ulcer, stricture of the esophagus or carcinoma of the stomach, bowel or esophagus. Rapid disappearance of the signs of the disease following removal or relief of the obstruction was the rule. Such cases strongly support Goldberger's conception of dietetic deficiency as the essential etiologic factor in pellagra.



**INTRACAPSULAR FRACTURE OF THE HIP SUBACUTE  
OSTEOMYELITIS AND ENDOTHELIOMA OF THE  
LOWER END OF THE FEMUR SLIPPING EPIPHYSIS  
OF HEAD OF LEFT FEMUR RECONSTRUCTION SHELF  
OPERATION FOR CONGENITAL DISLOCATION OF THE  
LEFT HIP OLD TRAUMATIC DISLOCATION OF THE  
LEFT HIP**

MELVIN S. HENDERSON

**INTRACAPSULAR FRACTURE OF THE HIP**

**Case I**—A woman aged sixty-four years living on a farm was admitted to hospital November 20, 1929. She stated that at 9:00 p.m. of the day



**FIG. 8 (Case I)**—Recent fracture of neck of right femur

before while dancing she had been knocked down by another couple. She had been helped to her feet and carried to a chair.



Rtg g m l s l s l t c a l f f t f t l n c k f the  
 ght f m (Fig 8) Th w l t g f t h l g d p n n o m t  
 f t h r g h t h p U n d a t h t l f c t u e t b l t l e m p t  
 w l k u j d t h l g w b g h t l t o q a l l g t h w t h t h r  
 l g t a t d i w l d b l c t l A o t g g m w t h n t a k a d  
 d l p e d b e f a c a t w p p l l (Fig 9) G o l p p o t w t h t h  
 h d n a l g p o t t h c k w h w A l b l p c a t w  
 p p l d t e d g f m t h t h x t t h t n t h r g h t l T l g h t  
 h p w b d t l l t h f t t e d T l c a t t d d t t h k e e n



FIG 9 (C) —After correction of the deformity valgus position

the position of the bar free of contact between the knee to maintain the position

Recent fractures of the neck of the femur are as amenable to treatment as fractures elsewhere. The impaction should be broken up under anesthesia and the deformity corrected just as one would do with a Colles' fracture of the wrist or a Potts' fracture of the ankle. By maintaining a valgus position it has been my experience that union takes place more rapidly even

than when the perfect anatomic reposition is obtained. Following any fracture there may be slight atrophy and absorption of the rough fractured surfaces of the fragments and thus the line of contact of each fragment may atrophy just sufficiently to allow slipping. With the valgus position as shown in Figure 9 if some slipping does occur the position assumed is more nearly anatomic.

It will be at least three months before this patient is allowed to walk and six months before any weight bearing is permitted. Roentgenograms will be taken at intervals and when they give evidence of firm bony union increased activities will be permitted. The earliest firm bony union I have seen in a fracture of the neck of the femur of this type occurred in three months. It is best to anticipate a six months disability without weight bearing in that time.

#### SUBACUTE OSTEOMYELITIS AND ENDOTHELIOMA OF THE LOWER END OF THE FEMUR

**Case II**—A man aged twenty-two years a salesman came to The Mayo Clinic July 5, 1929 with a history that about one year before there had occurred without previous trauma some swelling and pain in the lower end of the left femur which had laid him up for two or three days. Similar attacks had occurred nine and six months before examination at the clinic. The present attack really had begun three months previous to my seeing him and when he came to the clinic there was swelling and pain which had been relieved to a certain extent by taking acetylsalicylic acid and by heat.

The patient was 5 feet 9 inches in height and weighed 147 pounds. He said that he had lost about 12 pounds in the last eight months. The lower third of the left thigh was slightly enlarged and tender on the inner side. A definite tumor was not palpable. The Wassermann reaction of the blood was negative and roentgenogram of the thorax gave negative results. A roentgenogram gave evidence of tumor in the lower third of the left femur with thickening of the periosteal layer a portion of which was in leaflike formation (like an onion). There was an irregular medullary shadow which did not have a really definite line of demarcation (Fig. 10). A diagnosis of bone tumor was made probably endothelioma and operation for the purpose of exploration was decided. The patient agreed that if at exploration the clinical diagnosis of endothelioma should be proved to be correct amputation should be done. He was running a temperature of 99°F and leukocytes numbered 13,300 for each cubic millimeter of blood.

July 9 an incision was made on the outer side of the lower end of the thigh. The periosteum was found to be much thickened but not very vascular. The chisel was introduced into the bone and as it went through the

somewhat t po t e e t e x p u w i t h t h e l l f t h a t p o d c l i t y c l o n  
l l w e a c u a t d s e p u t r u n w a o t f o n d T h t u e r m l  
y s e t i m m d t l y t t h l h o u r y f d a g n o d a r i t w a  
r i d f i h o n f l u m m a t r y l i t e t e l e n f a r t t a d p e t e t  
W h e r a t g w c n c h e l l a l i f t t h a t r p e o p e t i e  
l g n o f n d t h i t w a w r g

C n a l s e e w a t r y s a t i f t o r y C o n l a b l l a l t n  
o c d t h e s o f t t s t h y b e c a n n f c t d m u h e l m a d e l p e d  
d t h e k t h t n a p u s l d s e l f i t h w l e  
q t l l l w t h l s e t t h s o f t t f i t h t l g h b e e



F 10 (C H) R n l e r f p o t n f f u w t h t h k h a l p  
l l t t h j t t l y t r g l y s g t g n l t l l

l o c k d u y b o d i l b l y l t o t l f t t h t t h e s o f t t h  
t i l p e l n m u t y t t h p t l t r g p s e n t  
T f p t t t i a l l t l l t p t o f a g u t o c t  
f s e l f e f t h l l g d n l n t W a l l g  
w p p l f b u t h l k w s t f a c t r y D a g c t n d d  
l h r p f l t A b o u t t h l t t e p a r t f v b e l l  
m k i v l l g f f t h n e l f t h l w e r d o f t h e f e  
d e p l t y t p p k n l b t p u w a s o b t a d T h r t t  
w t h m f k t t T h k g i g t n l t h c n l c k t h  
t h e l l g t l l r l (F k H) A t g g a n g s h d w

even more typical of endothelioma than the first one. December 3 the tumor was subjected to exploration and a large mass of organized vascular tissue was excised which proved to be an endothelioma. The wound was packed to control bleeding for consent to amputation had not yet been obtained. December 4 amputation was performed. Roentgenograms of the thorax taken previous to the amputation had showed the lungs to be clear.

This case serves to emphasize the difficulties in the diagnosis of bone tumors even when the tumor is subjected to exploration.



FIG. 11 (Case II).—Same as Fig. 10 three months later. The soft tissue tumor which proved to be endothelioma is bulging into the soft parts.

and the tissue is examined in the laboratory. Since there had been a suspicion that the tumor was an endothelioma, consent for amputation was obtained at the time of the first operation but at operation pus was encountered and it seemed probable that the tumor was not an endothelioma. The long convalescence was attributed to the type of infection present and the liberation of pus into tissues in which immunity had not devel-



More commonly than in others slipping epiphysis occurs in boys and girls of the husky robust type who are large for their age and often overweight. Trauma is the immediate cause. If diagnosis is made early manipulation and maintenance of abduction with inversion of the foot may give good reposition of the fragments but if the condition has existed for some time as in this case manipulative efforts are of no use. If allowed to go unreduced a large mushroom shaped upper end of the femur



FIG. 17 (Case III) —Partial separation of head of left femur in a boy aged fifteen years

will result often with marked eversion of the foot and leg. Later in life arthritic changes will further disable the patient. Hence anatomic reposition is important. In younger children Legg's disease or flathead is encountered whereas at puberty and thereabouts this type of slipping epiphysis is the more common. The shortening of 2 cm. cannot be accounted for by anything seen in the roentgenogram. I believe it likely that inactivity of the growing centers in this region has occurred





FIG 14 (Case IV)—Two year after reduction of congenital dislocation of left hip the foot is inverted the head of the femur is in the acetabulum although the latter is shallow



FIG 15 (Case IV)—Same as Fig 14 the thigh is extended. The previous position of the head in its relation to the shallow acetabulum is evident

vee of equal length and the child walked without any limp. The only abnormality noted at this time was a slight tendency to turn the foot



tward but th hile ld ly ec th wh he w em id f  
 t Roe tg g ms t k t th t t m how d the h d of th f w ll  
 pl wh th l g w t d (F g 14) but rath p s po  
 to wh t d (F g 15) The a t b l m wa h ll  
 l p t f th r q t to h e th pate t pot cc. lly h s  
 t b o ght b k t l O t be 1929 ght yea late F som t m the  
 p ts h d t d l p th t had bee g tt g w se l th chld w  
 thrt ny f g had c mpl n d th t sh t d ly f h w l k d f  
 R e tg g m (F g 16) d l ved g t l d l cat f th l ft h p



Fi 16 (C s IV)—C g t l d l c t te y aft ed t  
 Th h d f th f m t th f lse i b l m th t acetabul m  
 bl c t l

w th 05 m f h t ng f th l g d bl e r t n f th o l c e t b l m  
 Th w pot t T d l bug g nd th pat nt walk i w t l mp  
 S th l so k t ompl t ly bl t at d th p bl w  
 som way t p de m of k l t l w ght b g l t h be my  
 p t l t b y t r g do sh l f f b o f th l s e th t the  
 h d f the f w ll t g t t d th t m t w ght t l o g h th  
 p l wall g d f t ll ult Acc d gly th d n No b  
 18 (F g 17) A s th P t e s e c w a m pl y d r f l c t g t l s e l  
 tt hm t f th l ll by tak gal g w th th m s e l a tta h t  
 t th re t a f k f l e f n t l e l c t Th s heath n l

to be closed it would be easy to get a good strong suture to pull the upper part of the gluteal muscle and this flake of bone against the iliac crest. By introducing a curved hip chisel just above the false acetabulum a strong piece of bone was turned down over the head of the femur the gap thus produced was kept open by packing in it many chips of bone obtained from the iliac wall. The wound was then closed and a plaster of paris cast was applied which extended from the thorax to the toes on the left side and to the knee on the right side.



FIG 17 (Case IV)—The shelf of bone is turned down from the iliac wall to give skeletal support for weight bearing.

It is estimated that 75 per cent of the closed reductions for unilateral congenital dislocation of the hip are successful and that 50 per cent of cases of bilateral dislocation are successful. By that is not meant that all patients who obtain good results have joints which look normal in the roentgenogram. It is meant that they have satisfactory skeletal support that the typical waddling gait is done away with in cases of double dislocation and that the limp disappears in the unilateral cases. The Trendelenburg sign is obliterated in both. It is surprising



gams had showed fracture dislocation of the hip. He had been immediately placed in bed in a hospital with a Buck's extension apparatus applied. The next day a cast had been applied extending from the costal margin to the toes on the left side and to the knee on the right side. This had been left on for eight weeks when the patient had been allowed to sit in a chair for about thirty days. Following this period he had used crutches and had continued to do so up to the time of examination at the clinic a year after the accident.

When the patient was examined at the clinic he had no particular pain and tenderness was of variable degree. When he was standing he could raise



FIG. 18 (Case V).—Upward and backward displacement of head of left femur and fracture of the acetabulum.

and flex the left leg but when attempting further flexion was impossible. The patient weighed 215 pounds. The left leg was 8 cm shorter than the right and was held in a position with the hip partially flexed. He could not flex the left leg on the trunk beyond a right angle and he could not walk without crutches. Roentgenogram (Fig. 18) disclosed an upward and backward displacement of the hip; the head of the femur rested posteriorly high on the ilium. Evidently also there had been a fracture of the upper or and posterior rim of the acetabulum. An open operation was advised but it was explained to the patient that the head of the femur probably could not be reduced and placed in the socket and that if this could not be done some sort of skeletal

ppo t w ld be p v d d f sample Wh t m t t p e t  
 t r u t f a w t b l m A c d g l y A g u t 6 1929 t h  
 f t t b l t h e h p w p o s e d b y a m o d f i d S m t h P t s e  
 W t h M p h y r e a m h s u s e d f o t h p l t v w c t a b l m w  
 m d a l t t l h g h t h t h o l d o e b t t h s a m p l I t w w t h  
 d b l d f f i c l t v t h t t h h e a d f t h f m r l d b e b g h t f g h  
 f o r w d t p l a c t t w c t b l m b u t t h w f i a l l y a c c m p l h e d  
 T h l g w a h l d b d c t d p l t f p c a t w s a p p l i e d w h c h  
 t d d f m t h t h t t h t t h l f t d d t t h k n o t h



FIG 19 (C V)—S m e a s F g 18 f m t h f t o p e t o T h  
 l l t w t b l m t g b o y p p o t

g h t d w t h t h f t t h p g h t p t T h c a t w a r m d  
 S e p t m b 20 t h e w u d w f d t b e w l l h l d d g l p c a  
 t w p p l d t d g t t h l f t k e h l d g t h h p b d c t  
 C l w m l d t h p t e t w l l w e d t g h m O t b e l  
 w k f t p e t H t d n t h f i t p a t f D e c m b e r a d  
 m y n t m d D m b 4 f m t h a f t r p e t w f l l  
 R t g e g m h w l l t w t b u l u m (F g 19) M t  
 f w t h f t 150 140 d g r e e H m a y g t h t h c a t d  
 u r u t h f m t h t w H h l d h l l t l t  
 k l t l p p o r t p d d

When dislocation of a hip has existed for any length of time it is exceedingly difficult to reduce it. Even if the head of the femur could be brought down and placed within the acetabulum a stiff hip probably would result and it is better to accept moderate shortening and retain motion. The shortening can be compensated for by elevation of the heel of the shoe on the affected side and the patient will get along very well. The shortening in this case was only about 3 cm whereas previous to operation it was 8 cm.



# VOLKMANN'S ISCHEMIC CONTRACTURE BILATERAL CONGENITAL DISLOCATION OF THE HIPS IR REDUCIBLE FRACTURE OF THE MALLEOLI OF THE ANKLE TREATED BY OPEN REDUCTION AND BEEF BONE SCREWS BONE GRAFTING FOR DELAYED UNION FOLLOWING OSTEOTOMY AND THE USE OF A LANE PLATE TUBERCULOSIS OF THE HIP COM PLICATED BY PULMONARY TUBERCULOSIS TREATED BY OSTEOTOMY AND ARTHRODESIS

HENRY W MEYERDING

## VOLKMANN'S ISCHEMIC CONTRACTURE

Case L—A tud nt aged n neteen years complained of ma led flexion deform ty of th l ft hand and nability to use the fin ers Ten ea p viously he had su tained a mpl fractu e of the left rad u and ul a H phys cia mmedately had reduced th fractu e and had applied antero and poster or pl nt Fo th ee d s and nghts the pat ent had uffed terrific pain and swell g but the bandages had not been loo ened unt l the end of the th rd day A so e had developed on the anter o u l ce of the forearm nea the ulna bo dr and at th en l of weeks hen th pl nt finally h d been emo ed he had not been able to straght n the hn ers Roentgenogram then had gi en ev d nce of malun on nd operat on ha l been ad sed Two operat on had been pe fo med respect el ght nd fourteen weeks afte th original fractu e a d good un on had been obta ed Du ing the years that followed the e had been no pa n or d scomfort l ut th fo arm had grown mor and mo e def rmed and funct on had not impro ed The patient wa anxio us to ha the d figu ng d fo m ty corrected

Exam nat on d scovered typ cal contracture defo mt of Volkmann n ol g the left rm Th wer sca wh ch pres u e sores e dentl had p oduced and th fl xo muscles w e opel ke produc g claw ke contractu es of the w t and th finger Owing to th t n year durat on of the con it on and to lack of normal t mul growth had been reta ded and the left forearm was 5 cm hort than the ght The circumference of the left arm compari son with th ght was 5 cm les below the elbow and l 5 cm les abo e th lbow The wrt could not be extended e n w th the fig fl ed because of contracted capsules and so forth (Fig 0) The p nal column appea ed prom n nt o e the t nth thoracic vertebra an l roentg no rams d slosed e d nce of what wa apparentl an old f actur The Wa rmann ea t on on the blood and u al s ga e negat e result



Th ntg g ph appe a f the tl d f th l f t f ea m w  
 g t  
 Ope t w perfo d t r t th d f m ty d th h pe f  
 ca g som se f ct F rt d u d r th w f  
 l d r expe h d h w t t be h m f l f too m h f ce  
 w ppl d Th f w k g th gh a l g wh h te d d  
 w ll p f m th w tall f t d n w l g the d d cap l t m y w  
 p f m d t th w t Th f w appl d t t d th w t d f ge  
 the nd w t d d l g pl t w ppl d f m f g t p t  
 l bow A l g w ppl d t p p o t th m t ght gl th sec d



FIG 20—A l km sch m co tract f t n y d at b f  
 pe t

d y th i t t w out f b d d th fifth d y h w d m sed f m  
 h p t l Th w l t t f y p ft pe t Th t tch w  
 em d t th d f tw k d m g d t g f th m scle  
 w b g At th e d f t w k s th p t t h d m pow r f f  
 d co ld l ld b l l 75 m d met H a l l pl d w th th  
 t f th d f g g d f m ty (F g 21) H g d t t  
 phy th py t sch l d t t

The treatment of fractures should relieve pain and should not produce day or even hours of intense suffering. There is

no need to give narcotics except in rare instances when the fracture is reduced immediately as in this case. Great swelling and pain are nature's warning that circulation is impaired and unless steps are taken immediately permanent injury may result. Certainly cold blue swollen damp extremities in which the pulse is absent or almost absent indicate injury to soft tissues to be more significant than reduction of the fracture. Of what value was it to the patient that his bones were aligned when



FIG. 21—Same case as shown in Fig. 20 ten weeks after operation.

muscles, blood vessels, and nerves were crushed so that function was practically destroyed? It is better to leave the fractures alone and to treat the soft tissue if swelling has occurred. Later, in possibly a week or ten days, the fracture may be reduced. In the case cited, the injury had occurred ten years previously and deformity was becoming more marked at the time the patient came to the clinic. Conservative treatment is of little benefit in this type of case, and our experience led us to operate

is the only means of correcting the deformity and improving the function.

In early cases gradual stretching after the method of Sir Robert Jones is excellent treatment. In this method the phalanges are splinted straight then gradually the metacarpophalangeal joints and lastly the wrist are extended. Various types of splints permit this correction. Massage and heat at regular intervals are commonly used at the same time. Care exerted by padding well and avoiding constriction must be taken to prevent sloughs from pressure during the treatment.

In my series of 128 cases of ischemic contracture 10 per cent were in males and 90 per cent in females. 61 per cent were in patients less than thirty years of age and 33 per cent in patients more than thirty years of age. Fracture at the elbow are more common in males probably due to their greater activity. The majority of the fractures associated with the contracture are at the lower end of the humerus. In about 5 per cent of the patients there was no evidence of fracture at the time of examination.

The upper extremities were involved in more than 90 per cent of the cases. In conclusion it is well to remember that Volkmann's ischemic contracture may result from injury in cases in which bandage splints or plaster casts have not been used. This is an important medicolegal fact.

### BILATERAL CONGENITAL DISLOCATION OF THE HIPS

C. E. H. - This is a girl aged 11 years who brought to the clinic for treatment because of a deformity of the hips. She had been born with this condition and had been treated by various methods without success. She had been in the hospital for several months and had been treated by various methods without success. She had been in the hospital for several months and had been treated by various methods without success.

Examination of the hips showed bilateral congenital dislocation of the hips. The hips were in a position of flexion and adduction. The hips were in a position of flexion and adduction. The hips were in a position of flexion and adduction. The hips were in a position of flexion and adduction. The hips were in a position of flexion and adduction.

At that time the hips were in a position of flexion and adduction. The hips were in a position of flexion and adduction. The hips were in a position of flexion and adduction. The hips were in a position of flexion and adduction. The hips were in a position of flexion and adduction.

them in a double spica cast in frog position. Roentgenograms gave evidence that the hips apparently were in good position and the child was dismissed on the seventh day to return home. She was brought back to the clinic at interval of three months for change of casts and each time the hips were lowered 15 degrees and double spica casts were reapplied. Roentgenograms showed evidence of good position on each visit and at the end of ten months the patient was dismissed without a cast. The examination clinically and by roentgenologic method indicated satisfactory position. A year after the operation the patient again was examined and the position was deemed satisfactory. The parents reported that the child was getting along well that no further deformity had developed and that the condition was considered cured. In response to an inquiry sent out sixteen months after operation the report was rendered that the patient was doing very well and



FIG. 22—Bilateral congenital dislocation of the hips in a girl aged four years.

was walking apparently no matter. The legs had been measured by the family physician and had been found to be of equal length. Ten years later on inquiry it was learned that some lameness was apparent. Roentgenograms indicated that the right hip was in perfect position whereas the left had a very shallow socket and tended to move upward.

More recent experience has shown that excellent results can be obtained in stabilizing hips which are dislocated for long periods of time by making a shelf of bone on which the femoral head can rest. This operation is useful in old unreduced congenitally dislocated hips as well as in those in which the acetabulum is so shallow that dislocation occurs after reduction.

I have observed that late dislocation occurs after months of apparent reduction and care at the hand of excellent orthopedists. The value of careful follow up observation is generally recognized but at times it is difficult to accomplish especially when the patient lives at a distance of hundred of miles and in a pioneer country. In this patient I believe a shelf of bone produced by turning down a section of ilium or by a graft from the tibia would have prevented recurring dislocations. Should opportunity arise and the patient return the making of a shelf of bone above the head of the femur will be indicated so as to prevent further displacement and to permit formation of a new acetabulum.

Case III Irred c'ble f'ctu of th malleol of th ankl tre t d by p n red ct on and be f bone ws—A w ma ag d twe ty tw y w thrown f om t m b! h d o coll August 1925 j r g th l ft foot She wa tak t ly ty whe th tt d g phys took oe tg gr m d ppl d pl t f f t es f both bon f th kl Sh t d h m d th sam d y co ulted thoped t wh ft f rth oe tg g m f th malleol d sed n ttempt t mp th po t f th f ct H mm hat ly ga a esth t d ma p l t d th kl p tt g th l g pl t t w th the foot t ht a gl d lght aru S bseq t xam t a d oe t g r m f led t h w sat f ct ry po t and week lat th patient ga wa esth t d th foot ma p lat d to t m a u po t d ew ca t ppl d F d y l te f th ma p lat w ttempted ce th po to f th t agal d d t appe t be sat f t ry d t t mpt mad to f ct t w d F rth r roe tg gram sl w d th po t mp ed d th pat t w b ght t th el i

A tuly f the oe tg n gr m sh w d th t wh th po t f th te l l l se m d good the t t al m lleol w h ed too f w d Th f th co lt g geo f l t h t t w ld be be t t t eat th f t b pen d ct d t apply beef bon sc ew to hold th malleol th n l f ml post n (F g 23) A pl t r ca t w ppl d f om th toe t th h p w th th foot t ght gle d lght aru Cl call d oentge gram tak mm d at ly aft r ppl cat o f th ca t th f gm t w pe fect ppo t n a d the t gl w pl d Roe tgen gam t ke f a d h l f y a ft th pe at d cat d th t mple t bso pt n d dappe ce f th beef bo e ser w h d t k pl ce (F g 24) Th kle wa f ct g pe fectly

These fractures are commonly called Pott's fracture al though they are not true Pott's fracture and should not be



FIG 23 —Beef bone screw through internal malleolus following open reduction



FIG 24 —Ro ntgenogram of the ankle four and a half year after the use of bone screw of fracture of the malleolus Absorption of screws may be noted

treated as such Attempts at forcing the foot into varus position with both malleoli torn loose produce malposition of the frag

ments and subluxation of the astragali. This unless corrected results in permanent partial disability due to malunion and in congruity of the joint. In Pott's fractures the varus position with the internal malleolus intact can do no harm but in the instance attempts to reduce the fragments and to hold them in varus position or even in the ordinary cast were shown to be futile. I have seen fractures of both malleoli treated as Pott's fracture result in the most embarrassing situation and I believe that it is of considerable medical and legal importance to draw a sharp distinction between treatment of the true Pott's fracture and fractures of both malleoli. In this instance repeated manipulation under anaesthesia failed to reduce the fracture satisfactorily. I believe that fixation of the internal malleolus by beetle bone screws and proper reposition of the tibia constituted the operation of choice. If the facilities and experience of the surgeon are adequate so that no undue risk is run in the matter of infection better results are obtainable by such open reduction. In this instance the physicians were unable to reduce the fracture properly and after repeated trial and consultations operation gave a normal result.

Case IV. Bone graft for delayed union following osteotomy and the use of a Lane plate.—A laborer aged thirty years, a native of Massachusetts, came to the hospital because of a fracture of the right leg. The patient had been injured while working on a farm. The fracture occurred about six weeks before admission. The patient had been treated by a local physician with a cast and had been in the hospital for two months. The patient was in good health and had no other injuries. The patient was admitted to the hospital on October 1st, 1910. The patient was seen by the surgeon on October 2nd. The patient was examined and the fracture was found to be a comminuted fracture of the shaft of the right tibia. The fracture was about six inches from the knee joint. The patient was in good health and had no other injuries. The patient was admitted to the hospital on October 1st, 1910. The patient was seen by the surgeon on October 2nd. The patient was examined and the fracture was found to be a comminuted fracture of the shaft of the right tibia. The fracture was about six inches from the knee joint. The patient was in good health and had no other injuries.

On examination the right leg presented a mark of fracture. The patient was in good health and had no other injuries. The patient was admitted to the hospital on October 1st, 1910. The patient was seen by the surgeon on October 2nd. The patient was examined and the fracture was found to be a comminuted fracture of the shaft of the right tibia. The fracture was about six inches from the knee joint. The patient was in good health and had no other injuries. The patient was admitted to the hospital on October 1st, 1910. The patient was seen by the surgeon on October 2nd. The patient was examined and the fracture was found to be a comminuted fracture of the shaft of the right tibia. The fracture was about six inches from the knee joint. The patient was in good health and had no other injuries.

Since the deformity was un ghly the patient was anxious to have it corrected even though little improvement in function could be promised. The contractures about the knee and foot indicated that there would be difficulty in maintaining correction after osteotomy. Therefore the use of a Lane plate as well as a cast was advised and applied at operation. The leg was encased in a spica plaster cast from the toes with the foot at right angles. The wound healed by primary union and roentgenograms indicated good position. The cast was changed and the stitches were taken out on the eighteenth day. Ten weeks after operation roentgenograms failed to disclose evidence of callus or union and a new cast was applied. The tem-



FIG. 5—Malunion of femur of one  
case after fusion



FIG. 6—Malunion of femur cor-  
rected by osteotomy and Lane plate  
applied

perature and convalescence had been normal. The patient was given ergosterol 2 cc twice a day, thyroid extract 1 grain three times a day, and cod liver oil 4 drams three times a day. The cast was changed and roentgenograms failed to disclose evidence of callus or of union and clinically little motion was obvious. Massage and the mild medication seemed ineffective. The patient was anxious to leave the hospital and four months had elapsed since osteotomy. Delayed union was present with every indication of future nonunion and pseudarthrosis. Evidently something was interfering with normal formation of callus. The urine and blood were reexamined with negative results and because conservative measures had been unsuccessful I advised removal of the steel plate to be followed by bone grafting. At



pe at hu d d tw ty se e d y aft teot my fib  
 w fou d th wa o de c f callus the m d llary ca ty w fill d  
 w th f t d some f th se w hold g the pl t w loose Th t  
 bout th pl t wa d col d a d w emoved w th the plat d se ew  
 Th d f th bo we e e sed a d m lt ple g ft tak f m the t b  
 w d O gr ft 5 cm l gth d 0.5 cm diam t w placed  
 th m d ll ry cav ty d cu et d can ell bo w p cked betw n A 15  
 m ma e graft w placed the o te d f the f mur d secu ly  
 f te d by mea f fo be f bo e screw The n m mall g aft  
 we e pl d bo t the esect de d Th w d wa cl sed t ghtly d  
 f m mp b d g w ppl d w th a p ca ca t xt d g t th



FIG 27—B g ft a d be f bo e screw sed f flow g use f La pl t  
 delayed was follow d by ap d

t es l tw d half mo th th p t tw d m sed f th h p tal  
 w th f m n we g cal pe f p t t Th e m th aft ope  
 t h tu d h m (Fg 25 26 a d 27)

# TUBERCULOSIS OF THE HIP COMPLICATED BY PULMONARY TUBERCULOSIS TREATED BY OSTEOTOMY AND ARTHRODESIS

C V—A ma g d th ty se y cam t tl cl M h  
 1929 beca se f p d d f m ty of th ght h p of f yca d at  
 Tw ty fi e y p ly h h d f ll f f m be cycl d had bee  
 t ld th t tl ght h p w l l t d Ope pe t h d be pe f m d  
 the d t l f wh h w th d fi t t h d p nary heal g f

the wound had taken place. He had worn a cast for one year after the operation. As time had gone on he had limped slightly because of difficulty with the right hip and he had thought that the right leg was somewhat shorter. Twenty one years after this accident and the operation pain had developed in the hip. It had recurred at irregular intervals and finally adduction and flexion deformity had resulted. His symptoms always had been worse in the winter and the pain had been referred to the knee.

When I saw the patient he had recently lost 15 pounds in weight, had night pains and night sweats, required crutches and the deformity of the hip was becoming more marked. He was 5 feet 6 inches in height and weighed 124 pounds. His normal weight, he said, was 142 pounds. Blood pressure, pulse and temperature were within normal limits. He walked with a marked



FIG 28—Tuberculosis of hip with adduction flexion deformity

limp due to flexion and adduction deformity of the right hip. There was marked talipes equinus and marked atrophy of the right leg. Some lesions were found in the apices of both lungs. Results of urinalysis and of the Wassermann reaction of the blood were negative. Secondary anemia was present. Roentgenograms disclosed evidence of tuberculosis of the apex of the right lung and on clinical investigation there was found to be some activity of this lesion. Sputum could not be obtained. Diagnosis was made of tuberculosis of the right hip joint with adduction flexion deformity and pulmonary tuberculosis.

I felt that arthrodesis and osteotomy under spinal anesthesia could be performed safely. Accordingly osteotomy was done and bone grafts were used to produce extracapsular arthrodesis. The bone for the grafts was taken from the femur and the ilium. There was a slight discharge from the

w i f l l w g p e r t b t c o l s c w t h r w s e i f l  
 C t w h g d t t r l f s c l m t h A t t h d f n e m t h  
 t h p t t w p d d t h a d g o o d f i m f w f d  
 t b e p t (F g 28 1 9)

Tuberculosis of the hip if treatment is not given results in deformity and drainage of material from the hip. In this instance operation has permitted correction of the deformity and fusion of the hip joint with complete and permanent relief of pain. Also the extremity is held in the most useful position



FIG 29—P t p e t t b e l f h p t l t h f t t e o t y  
 d t h d

for future function. I have performed similar operations a number of times with good results. I believe that fusion combined with osteotomy is practical and that it saves the patients from disability for an unnecessary length of time. It is necessary at times to perform tenotomy of the adductor tendons and to use considerable force following osteotomy to obtain correction. The trochanters usually allow sufficient bone to be used as bone grafts. Fixation with plaster casts must be maintained until the surgeon is thoroughly satisfied that fusion is complete.

## PSEUDOMYXOMA PERITONAEI OF OVARIAN ORIGIN AN ANALYSIS OF THIRTY CASES

JAMES C. MASSON AND ROBERT A. HAMRICK

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PSEUDOMYXOMA peritonaei which frequently is referred to as mucous ascites is a condition of the peritoneum in which masses of gelatinous pseudomucinous or mucinous material is distributed over its surface either as a homogeneous layer or as multiple cystic masses. Pseudomyxoma peritonaei is of relatively rare occurrence. It is most often seen in women associated with ruptured pseudomucinous cystadenoma of the ovary. More infrequently it is encountered by the general surgeon following rupture of mucocoele of the appendix. Other still less common sources of origin are discussed by different authors. The reception of the semifluid material by the peritoneum may be purely passive or the response may be by generalized peritoneal thickening cellular infiltration the formation of connective tissue producing firm adhesions proliferation of secondary tumors and formation of multiple cysts or by a combination of all of these. It is not uncommon to find the reaction of the peritoneum different in various parts of the abdominal cavity. The gelatinous material may be colored in various shades of red yellow brown and grayish white depending on the amount of hemorrhage fatty material cholesterol and cellular detritus that occur within the cystic masses.

Recently one of us (Masson) operated in a case reported by Dowley in which there was a cystadenoma in the anterior wall of the uterus the lining cells of which resembled the cells in the endocervix the acini were filled with clear mucinous material. This might suggest implantation as the etiologic basis for these tumors.



FIG 30—A pseudopodial cytoplasmic network



FIG 31—A portion of the pseudopodial cytoplasmic network  
 column of the epithelial layer. Much cellular debris present.



FIG. 32.—A section of malignant pseudomucinous cystadenoma



FIG. 33.—Gross appearance of some of the pseudomucinous material removed at operation on a patient who had pseudomyxoma peritonei of ovarian origin



FIG. 34—A section of benign pseudomyoma of the ovary showing cellular detail.

### ANALYSIS OF CASES

The histories of thirty cases of pseudomyoma peritonei secondary to ovarian tumors seen in The Mayo Clinic during the last eighteen years were reviewed. During the same period 6865 patients with benign tumors and 950 patients with malignant tumors of the ovaries were subjected to operation. Questionnaires concerning their present health were sent out to the thirty patients who were not known to be dead. The average age of the patients was forty nine and nine tenths years; the youngest was aged twenty nine years and the oldest sixty three years. The greatest number, thirteen, of the patients were in the sixth decade. Eighty per cent of the patients were aged more than forty years. The thirty patients had fifty four operations, thirty nine of which were performed at The Mayo Clinic. Microscopic examination of the tissues removed showed thirteen (43.3 per cent) of the growths to be malignant and seventeen (56.6 per cent) to be benign. There was a history of malignancy in the families of three of the patients, but in only one of the e

patients was the myxomatous condition malignant. Twenty-eight of the patients were married and twenty-one of them had children. Of twenty-five cases in which the menstrual history was given definitely, in 84 per cent menstruation was normal and in 16 per cent there was a history of some irregularity previous to menopause.

The condition apparently gives little if any inconvenience until enlargement of the abdomen is noted. The complaint of increase in size of the abdomen was made by nineteen (63.3 per cent) of the patients. This was the only characteristic symptom in eight (26.6 per cent) of the cases. As a rule it is very gradual but three patients noted rapid distention. Associated with the abdominal enlargement there may be either a gain or loss in weight. As pressure increases such symptoms as bearing down, urinary frequency, and shortness of breath develop. Abdominal pain was the symptom next in order of frequency and was characteristic in fifteen (50 per cent) of the cases. Six of the patients complained of acute attacks of pain. In some of the cases this was probably due to other conditions as five patients had stones in their gallbladders as well as pseudomyxoma peritonei. One patient had an associated duodenal ulcer. Bloody vaginal discharge was complained of in four cases. In one case the discharge was markedly malodorous and following hysterectomy in this case a degenerating cystadenoma was found implanted in the fundus of the uterus. Two patients gave histories suggestive of peritonitis with pyrexia; at operation they were found to have fistulae between the cysts and the intestinal canal. One of these also complained of attack of diarrhea and passage by rectum of considerable amounts of mucoid material.

Most of the patients had had symptoms for more than eight months before coming to the clinic but one had been free of any suspicion of trouble until ten days before she arrived. There is no doubt that many of them had large symptomatic tumors for a considerable length of time before trouble was suspected.

General examination of the patients usually revealed the presence in the abdomen and pelvis of a large tumor or of



more than one tumor. Sometimes very little could be palpated other than a large tense abdomen and the questionable presence of a fluid wave. Mild secondary anemia was present in some instances. The amount of hemoglobin (Dare) was estimated usually as between 60 and 70 per cent. The lowest amount of hemoglobin 31 per cent was found in a patient twenty nine years of age who in addition to carcinomatous pseudomyxomatous peritonaei had localized peritonitis as the result of rupture into the terminal portion of the ileum.

At operation all the patients were found to have large quantities of gelatinous material free in the peritoneal cavity. In one case of intracystic and extracystic carcinomatous papillary pseudomucinous cystadenoma 26 liters of fluid and semifluid material were removed from the abdominal cavity and the patient is still alive four years and eight months after operation however there are symptoms of recurrence at the present time. In some case there were secondary cystlike masses attached to the parietal and visceral peritoneum with extensive firm adhesions. In several cases the wall of the bowel appeared to be involved and in separating adhesions and attempting to remove the material great care had to be exercised not to injure the bowel. Injury to the intestine occurred in two cases and resection of the small bowel was necessary in one of them. Infected pseudomucinous cystic tissue was found in two cases as the direct result of the new growth extending through the intestinal wall. In ten cases the omentum was especially mentioned as showing marked involvement and in four cases it was thought best to remove it entirely. In two cases mucocele of the appendix also was present. Besides the removal of the involved organs as much of the gelatinous material as possible was manually removed at each operation. Some of the patients had multiple operations for the removal of gelatinous material from the peritoneal cavity. Drains were not left in the abdomen following operation in any case. Such a procedure is thought to increase the chances of peritonitis developing in these cases.

Both ovaries were affected in fifteen cases the right only in nine cases and the left only in six cases. In two cases in which

the disease was bilateral a carcinomatous cyst was present in one ovary and a benign pseudomucinous cyst in the other. In one case there was chronic cystic oophoritis on one side and ruptured carcinomatous cystadenoma on the other. In another case there was a large ruptured pseudomucinous cystadenoma and a dermoid cyst in one ovary and multiple simple cysts in the other ovary. Three patients had a normal or atrophic ovary on one side and a ruptured pseudomucinous cystadenoma on the other side. In two cases there was a small hemorrhagic or tarry cyst in one ovary and a ruptured mucilaginous cystadenoma in the other ovary. One woman had a simple ovarian cyst on one side and a ruptured pseudomucinous cystadenoma on the other side.

Although the gross appearance in pseudomyxoma peritonei may be that of a malignant condition on microscopic examination a carcinomatous condition is not always found. Definite microscopic evidence of a malignant condition was present in only 43.3 per cent of the cases. In 73.3 per cent of the cases in which involvement was bilateral the condition was malignant. A papillomatous type of pseudomucinous cystadenoma was present in seven (23.3 per cent) of the thirty cases. Five of these seven patients had bilateral ovarian involvement and presented microscopic evidence of the presence of a malignant process.

There were five postoperative deaths following thirty nine operations a mortality rate of 12.8 per cent. Fifteen (50 per cent) of the patients had undergone elsewhere than at the clinic operations for cystic conditions of the ovaries or for pseudomyxoma peritonei. Two of the postoperative deaths were from pulmonary embolism and occurred respectively on the seventeenth and eighteenth days after operation. The other three patients died of peritonitis respectively on the fourth sixth and seventh postoperative days. One of these patients was known to have had pseudomyxoma peritonei for six years and four months another for four years and two months.

There are records of seven cases in which the patients died apparently from the natural course of the disease (Table 1)

TABLE 1

C	Ave h m f De	I r l be f m m d	I r l l ee m h d h	t l m d	R d m oe t h p	Appa Alp	C e f d h
	7	4 m h	3 m h d s	Pre	G	Appa Alp	
2		3 4 m h	3 s	Al	C	App re by	
3	58	U k	2 6 m h	Ab	C	f reu fee	
4	0	12 13	11 s	Als	N k	D s h m ked j	1 1 1 by f m m res
	9	10 m hs	6 m h	P ee t	C	N t go	
	6	8 11 m h	y 3 m h	Ab ee	G	N go	
7	55	1 6 m h	1 s 5 m h	Pre	G	N	

TABLE 2  
VARIOUS DATA CONCERNING TWELVE PATIENTS WHO ANSWERED THE QUESTIONNAIRE

C	Age y	Agg t t m p e t	I t r v l bet d t f ympt ms q w g f est	I t r v l bet t f d g f q est	p	M d p l g t d i	R d m t g th p y	H lth t t m f	sq t
1	37		3 y 1 m th	2 y 2 m th		P t	C	G 12 l d f lt ll	1 g m t f l l m
2	51		1 y 3 m th	1 y 2 m th		P t	G	C 117 p 1 f lt ll lght	1 x m t f l l m
3	48		U k	1 y 11 m th		Ab t	N t r	S m 1 ht 11 m l i	1 g m t f l l m
4	63		11 y 6 m th	11 2 m th		W t	A t l b y	1 lt ll 1 g m t f l l m	
5	65		1 11 m th	3 y 7 th		Al t	C	C 120 p 1 f lt ll	
6	52		4 y	3 y		Al t	C	C 10 p 1 f lt ll	1 m t f l l m
7	41		5 y 9 m th	5 y 9 m th		P t	G	C 140 po 1 f lt f most k 1 dg f d	ll m d b phy
8	31		5 y	4 y 8 m th		P t	G	E 1 g m 1 f bd m p f l eu f g l b d d d	ympt m f l
9	44		5 y 2 m th	3 y 8 m th		Ab t	G	W t g t mp	
10	52		6 y m	6 y		Ab t	N d	F lt ll 1 g m t f bd m	
11	57		4 y 3 m th	3 y 9 m th		Ab t	C	F lt t t th f y m 1 g m t f bd m p t t h d l t 5 po d ympt m f l i	lth h
12	60		2 y 4 m th	2 y 3 m th		P t	G	G d 4 p d d t mp	d m bd m l

O 1 m th m

Their average length of life after the onset of symptoms was four and three tenths years. In all but one case treatment by radium or roentgen ray was given after operation. The shortest interval between the onset of symptoms and death was four months. In this case there was microscopic evidence of a malignant condition and death occurred at home suddenly three months and ten days after operation. Death apparently was due to pulmonary embolism or to cardiac failure. In three of these seven cases microscopic evidence of a malignant condition was found at the time of operation and the average length of life after onset of symptoms was ten and six tenths months. The four patients in whose cases microscopic evidence of a malignant condition was not found lived for an average of six and nine tenths years after the onset of symptoms or six and two tenths years after the diagnosis of pseudomyxoma peritonei had been made at operations. One of these patients lived twelve to thirteen years after the onset of symptoms or eleven years after a definite diagnosis had been given at operation. She underwent five operations and at the time of death she was deeply jaundiced. The jaundice was thought to be due to the pressure of tumors on the liver and the bile passages. Another patient lived eight years and eleven months after the onset of symptoms and eight years and three months after an operative diagnosis of pseudomyxoma peritonei had been made.

Twelve patients who are living at various intervals since the time of operative diagnosis have answered questionnaires or recently have submitted to examination. Records of these patients are given in Table 2. One patient is living eleven years and two months after operation. At operation the following abnormalities were found: a ruptured multilocular pseudomucinous cystadenoma of the ovary, large quantities of gelatinous material in the abdominal cavity and pseudomucinous implants over the intestines, omentum, mesentery and surface of the liver. Microscopic evidence of a malignant condition was not found. This patient was sixty-three years old at the time of operation and was advised to have postoperative roentgen ray treatment but no record to indicate that she submitted to

that kind of treatment was found. Two years previous to the time of her operation at the clinic a large ovarian tumor had been removed elsewhere. In reply to the questionnaire she stated that at the time she was writing she felt well and that there had been no enlargement of the abdomen. Also she had not undergone further operations. Four others of these twelve patients are living five years after onset of symptoms. In two of these microscopic evidence of a malignant process was found and the abdomen of one of the two at present is markedly enlarged. Nevertheless in her reply to the questionnaire she stated that she felt well.

Records of the necropsies of five patients who died following operation were reviewed. The peritoneum and abdominal cavity were found to be covered generally or studded with pseudo mucinous masses. Some of these cysts were lined in places with epithelial cells of a kind which secretes mucus; these cells are either low cuboidal or high columnar in type. Some of the pockets of which the content was gelatinous had no special lining except connective tissue. Occasionally a free cell or more was seen in the mucoid masses. The cystic masses contained many strands of connective tissue which could be seen both on gross inspection and on microscopic examination. In some cases pseudomucinous cystic masses were found embedded in the edge of the liver and spleen but apparently they did not invade the parenchyma of these organs. In one case a cystic mass at the pylorus had caused obstructive dilatation of the stomach. In another case the muscle of the diaphragm was almost completely destroyed by a pseudomucinous tumor as the result of a perforation in the peritoneal surface of the diaphragm.

#### COMMENT

Chemical analysis was made of the gelatinous material obtained from four patients with pseudomyxoma peritonei of ovarian origin. The material was alkaline in reaction and gave the chemical characteristics of pseudomucin. In two of these cases cultures were made for bacteria and for yeast; there was

In reviewing the analysis of the cases of pseudomyxoma peritonei of ovarian origin one is struck with the relatively large proportion (50 per cent) of bilateral ovarian involvement. In an analysis of thirty cases of unruptured pseudomucinous cystadenomas of the ovary which will be given in another paper bilateral involvement was found in only 24 per cent of the cases. Also it should be mentioned that in this series of cases of unruptured pseudomucinous cystadenoma there was microscopic evidence of a malignant process in 26.6 per cent whereas in the series of cases of ruptured cystadenoma associated with pseudomyxoma peritonei there was microscopic evidence of a malignant condition in 43.3 per cent.

When a malignant condition is associated with pseudomyxoma peritonei it is usually of a low grade according to Broder's classification. The prognosis in pseudomyxoma peritonei in which malignancy is found appears to be definitely worse than in those cases in which it is not found although in two cases in which microscopic examination gave evidence of a malignant process the patients are living for between five and six years after the onset of the symptoms. One of these patients, however, had marked enlargement of the abdomen when last heard from. Two patients are worthy of mention again, one is living without symptoms for more than eleven years after diagnosis was made at operation, the other died eleven years after the diagnosis was made at operation. There was no microscopic evidence of a malignant process in either of these cases.

Factors which bring about death attributable to the operation are pulmonary embolism and peritonitis. Death may be due to various factors other than the operation. Information about one patient who died at home was received by letter and the symptoms before death were suggestive of intestinal obstruction. Another patient died in a condition of marked jaundice which was thought to have been due to the effects of pressure on the biliary tract. Very likely pressure exerted by the abdominal tumor has a most important influence on a patient's well-being. Another patient died of intercurrent infection. It is known that the gelatinous cyst can perforate into a hollow

ALCU In two cases that have been mentioned perforation into the small bowel took place and in one case the uterus was invaded. Wilson mentioned a very unusual case in which apparently there was a metastatic pseudomucinous tumor in the lung; this was thought to have arisen from pseudomucinous adenoma of the ovary.

Probably the manner in which the body combats the disease is by walling off the gelatinous masses as thoroughly as possible. A patient whose case formed a part of this study underwent abdominal exploration eleven years after a diagnosis of pseudomyxoma peritonei had been made at operation. Large quantities of unencapsulated and encapsulated pseudomucinous material were found at the second operation. The encapsulated gelatinous masses were mainly in the lower part of the abdomen. It was thought that the disease may have been reactivated after the long interval by rupture into the upper part of the abdomen of a mass that had lain encapsulated since the first operation. The encapsulation or walling off feature was noticeable in this instance and was probably the result of the ordinary peritoneal reaction against a foreign body.

Treatment of these patients is based on surgical measures and on treatment by radium and roentgen ray. The surgical treatment has a twofold purpose namely elimination as far as possible of the etiologic factors and relief from pressure. In a woman who is past the menopause removal of both ovaries and the appendix is urgently indicated. Frequently the peritoneal side of all the pelvic organs is involved. If the uterus is invaded by terectomy also is indicated. In a woman who has not passed the menopause it is desirable to save at least one ovary and the surgeon should take into consideration the type of pseudomucinous cyst in the affected ovary. The incidence of bilateral involvement in these cases is greatest (15.5 per cent) when microscopic evidence of a malignant condition is present. The general incidence of bilateral ovarian involvement in the presence of pseudomyxoma peritonei as already mentioned is 30 per cent. There are instances in which the omentum is so large and boardlike that its removal is worth while. As much



of the gelatinous material is possible should be scooped out of the abdominal cavity. This tends to alleviate pressure and possibly helps the patient to increase resistance against the disease. Adhesions which cause intestinal obstruction should be freed and any perforating injuries to the bowel should be given attention.

Eighteen of the thirty patients are known to have received courses of treatment by means of radium, deep roentgen ray, or both. Most of the others probably received treatment by roentgen ray after they went home from the clinic. Treatment by roentgen ray and radium should be given postoperatively in all the cases. Desjardins stated that mucoid tissues are usually very resistant to treatment by roentgen ray, but occasionally a patient's condition is improved after such treatment.

#### SUMMARY AND CONCLUSIONS

1 The largest number of cases of pseudomyxoma peritonei of ovarian origin was found in patients in the sixth decade of life. The average age was forty-nine and nine tenths years. Eighty per cent were past the age of forty.

2 Swelling of the abdomen and pain are the two most constant symptoms. The average duration of symptom before operation was less than one year.

3 On general examination the pelvis and abdomen are usually found to contain one mass or more. A large tense abdomen with a fluid wave, questionably present on palpation, may be the only abnormality found.

4 The right ovary was involved more commonly than the left in this series.

5 There is a higher percentage of bilateral involvement in patients with ruptured pseudomucinous cystadenoma than in patients with the same type of unruptured tumors. This bilateral involvement is specially marked in cases of malignant lesions.

6 In case in which papillomas were present there was a high proportion of bilateral involvement.

7 Pressure phenomena from the mucilaginous tumor, phy-

a large part in the health of patients with pseudomyxoma peritonei

8 Pulmonary embolism and general peritonitis were the chief factors in operative mortality in this series

9 The prognosis is naturally better in cases of benign lesions. One patient lived for eleven years after diagnosis was made at operation and another is living without symptoms eleven years after definite diagnosis. The duration of life after diagnosis may be from four to seven years

10 Removal of both ovaries and the appendix is urgently indicated in women who have pseudomyxoma peritonei of ovarian origin and who have passed the menopause. In women who have not passed the menopause it is generally desirable to save one ovary and the surgeon should take into account the type of growth in the affected ovary. The leaving of one ovary is of questionable value. Hysterectomy is indicated in some cases, resection of the omentum is indicated in others. As much of the gelatinous material as possible should be manually removed from the abdominal cavity at the time of operation.

11 The bowel and even the uterus may be perforated or invaded by the pseudomucinous tumors.

12 Treatment by roentgen ray and radium should be given in all cases.

#### BIBLIOGRAPHY

1 Desjardins A U. Personal communication

2 Wilson T. Gelatinous glandular cysts of the ovary and the so called pseudomyxoma of the peritoneum. Proc Roy Soc Med 1913 Sec Obst and Gynec vi 9-42



# MULTIPLE SPONTANEOUS ARTERIAL ANEURYSM

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## REPORT OF A CASE

THE patient a farmer aged sixty years came to the clinic complaining of loss of weight and strength. He had had diphtheria when a child, scarlet fever at the age of fifty two years and recently he had had an attack of tonsillitis. His father had died of heart trouble at the age of sixty eight years and his mother had died during pregnancy at the age of thirty four years. He had two brothers and two sisters who were living and well. He had had hemorrhoidectomy in 1915 and an operation for maxillary sinus in 1929 with satisfactory recovery in each instance. He had never been robust although he was able to work almost every day. The present illness began with gradual loss of strength and energy about four months before the patient came to the clinic. Eight weeks before examination he had had a sudden pain in the region of the urinary bladder that was almost constant for a few days and then gradually wore off. It was absent at first for a few hours and it finally disappeared. Emptying the bladder seemed partly to relieve the pain. About a month before the patient came to the clinic and just about the time the distress in the region of the bladder disappeared he was seized with a sudden severe tearing nonradiating pain in the right lower abdominal quadrant. This pain was constant and severe and lasted several days then it gradually wore off. Residual soreness finally became localized near the umbilicus. For the last two weeks a burning sensation had been present in the epigastrium that came on every day usually about two to three hours after meal and was relieved by food. At night the pain occurred between 7 and 3 a.m. and was relieved by hot fluid or food. During these two weeks the patient had lost about 14 pounds. This was probably due in part to voluntary restriction of food.

Examination revealed a palpable mass to the right of the umbilicus that seemed to be slightly cystic and tender. The blood pressure on two occasions were 176 and 120 and 150 and 110. The pulse rate was 96 and the temperature 98.6 F. Free acid was not present in the gastric contents and the total acidity was 12. The hemoglobin was 60 per cent (Dare). The erythrocytes numbered 3,570,000 and the leukocytes 9,500. Roentgenograms of the stomach, gallbladder, cholecystocolon, kidney, ureters and bladder were negative. The Wasmann reaction of the blood was negative. After many consultations it was decided to explore the cystic abdominal mass near the umbilicus.

C b d e l r t l y l th w u s e l O p e t a l d  
 m u l t p l a r m f s o n f t h m l l r t n t h m e s e t r y f t h  
 b o w e l n d l b o t h r v t u f t h e t m h T w f t h e e r y m  
 w e e t h o m b o s e d m k g m a p p o m t h y 4 l y 2 b y 2 c m t h e m d d l  
 o f t h a b d m e T h w t e m e d f m p i v a m a t n O t h  
 t m o o g f k l s e t h l l m l c a t y o r t c o t e t w e  
 t p e s t

The p t t w l m s e d f m t h h p t i n t w w e c k w t h t h  
 o u d f l e d S m t h f t t l e p e t h w b l t l e b o t d  
 t l i g h t k



F G 35—T l w l l f t r y d t h r m b o s e d r y A t h  
 l a t c o t v t e b k n d t h t n a t h e k d B t h l t  
 l g t h e w l l b g t l m e d h p a t p l d b y f i b e t e  
 t s d b y o g d b l o o d c l o t t h a l l t h d d t h r y  
 b e g h c i t l b l o d c l t t h y m (X 15)

H t l g v a m t o f s e c t t h g h t h t h r o b o d r y m  
 w l l r y h a l k e T h e w a p r l f r t o f t h t m a f t h s e l  
 n d a t p l (F g 35 a d 36) t h e t l e l t c c o t t u a  
 b k n B y d t h f f g m n t t w h c h w l l y t h g f  
 t h a n r y m (F g 3 b) t h m d w s e p a a d d p l a c e d p a r t b y  
 c o c t t u d b y g a i g b l d l t (F g 35 b d 36) S t i l l  
 f r t h e t o t h g h t f t h p e t u (F g 35 c) w e e t h e l a t d b l o o d c l t  
 o o m m o n l y t l m b o l r y m A t h w a l l f t h r y m  
 b e m g l t h t h e l t b o t s e m e d t b e c o m a g l y  
 t h k (F g 35 l 36)



FIG 36—Higher magnification of the area in Fig 35 illustrating proliferation of the intima with fragmentation of the elastic layer ( $\times 50$ )

#### COMMENT

Kaufmann described multiple muliary aneurysms which apparently arose on the basis of previously existing arteriosclerosis. They are described as occurring usually in the brain, intestine and lungs. The aneurysms in the case reported here also arose on the basis of arteriosclerosis and are similar to those described by Kaufmann except that they are larger.

Kolodny reported data concerning a patient who had multiple aneurysms of the right axillary, the left carotid, the right external iliac and the right popliteal arteries and of the thoracic descending aorta. He likewise ascribed arteriosclerosis as the most common cause of the disorder and syphilis as the next most common cause. Many other observers<sup>1-4, 5</sup> have reported

multiple spontaneous aneurysms but most of these concern post mortem observations

In our case it is difficult to determine just what particular symptoms to ascribe to the presence of the aneurysms but since exploration of the abdominal cavity was otherwise negative some correlation must exist between the symptoms and the aneurysm. The case demonstrated again the value and occasional necessity of surgical exploration as a diagnostic procedure. The clinical data and history that is the periodic pain, mild anemia, loss of weight, palpable abdominal mass and the absence of free acidity in the gastric contents all pointed toward a malignant gastric lesion and only by operation with removal and examination of tissue could the diagnosis be established.

#### BIBLIOGRAPHY

1. Appleton, H. A. *Int. J. Surg.* 1916, 452-453.
2. K. F. M. F. L. L. H. B. H. D. P. H. L. G. S. H. A. *Ed. 7. d. 8. B. L. N. W. L. d. C. y. t. d. C.* 1922, p. 106.
3. K. O. L. d. y. A. t. l. M. L. t. p. l. a. r. y. n. f. l. g. l. R. p. o. t. f. ca. *J. Am. Med. A.* 1926, loc. 397-398.
4. M. D. L. d. C. f. m. w. t. h. m. k. l. E. h. s. e. *J. h. E. O. b. s. r. v. t. m. L. d. S. y. d. h. m. S. o. t. y.* 1884, pp. 130-132.
5. S. g. l. H. N. A. x. p. t. l. t. y. l. t. g. t. f. t. h. b. l. o. o. d. d. b. l. c. h. l. f. t. h. l. y. w. t. h. p. e. l. f. t. t. h. p. a. t. r. v. t. y. l. t. f. t. h. l. e. t. l. t. t. g. l. l. g. t. f. t. h. h. p. t. t. r. y. R. p. t. f. c. a. s. e. f. t. l. t. c. n. r. y. m. f. t. h. g. t. d. l. l. r. t. y. S. g. C. y. d. O. b. t. 1913, vol. 152-178.

# CASES FROM THE CLINIC OF HAROLD I LILLIE ASSISTED BY HENRY L WILLIAMS JR

HAROLD I LILLIE ASSISTED BY HENRY L WILLIAMS JR

## BILATERAL SIGMOID SINUS PHLEBITIS AS A CAUSE OF GENERAL SEPSIS

A BOY aged four years whose ears were discharging was seen at the clinic February 20 1928. Two weeks and a half before then an acute upper respiratory tract infection had been followed by pain in the right ear. The tympanic membrane ruptured spontaneously and the ear began to discharge. A few days later the left ear began to discharge. The child had slept poorly and he had had a fever of 102° F. On admission the patient complained of tenderness and pain above and behind the right ear for the first time. Both sides of the neck had been tender and swollen for several days.

The right canal was found to be filled with a large quantity of purulent material and there was a small perforation in the anterior upper quadrant of the tympanic membrane. The left canal contained a large quantity of purulent material and there was a pinpoint perforation anteriorly. Tenderness of the mastoid or sagging of the superior wall of the canal was not present on either side. The mucous membrane of the upper respiratory tract was generally injected and a bilateral cervical swelling with palpable nodes on the right side was noted. A roentgenogram showed cloudiness and a diploic type of mastoid on both sides. The thorax heart and lungs were normal.

Two days later the condition had not changed except that large palpable nodes were present in the anterior triangle on the left side. Because of the type of temperature the patient had put ice and hot compresses were applied over both mastoids. The diploic type of temperature continued and on the second day after admission a definite contact of the left canal was noted without however drooping of the superior wall of the canal or any tenderness of the mastoid. An otorrhea of the ear was noted. The breath was noted to be foul. Potassium citrate was given. The child was nursed on a diet of 10 percent glucose solution. On the fifth day after admission the palpable nodes on both sides of the neck had disappeared and definite sagging of the superior wall of the left canal was noted. A tentative diagnosis of suppurative otitis media was made and the left mastoid was opened.



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 the g t cell w r t The kee f the s u a pe  
 the pl in l t n t tl co t a l ft r it w a n co e d th d a  
 f l t t r l l n l l t l w l l w l n l t l l e l r a t l u u s u l l  
 f l t t c Th wa u co r e d e t ly h o v e d l l o w  
 t l k f t l l u t l s o l t l y n r m l l u a w r n t co n t e r e d  
 f l l l l w l m l l p a l s o k l s p e t r o l a t m w p l c e d n t h  
 l w k w p l a c e d n t h e  
 g l t h f y l t e r o p e a t n t h e i g h t c a n l w l r y a d t h e t y m  
 e w r p l y r t u n g t r m a l c o l a d l t Th  
 l t b e g o o d c o l t w t h n p a r t i c u l a p u l s a t f t h  
 f l t e v l n p l t l l w e r t h i m p e r a t  
 l l t t t y p e C u l t l t h l l o o d o t h n t h d a f t r a d m s o  
 f l t g w t h n l t y e i g h t l O t h t t h l y f t r a d m s o  
 t h l p l o d w n l g p a l p a b l d t w a c o n f i r e d p o s  
 t l t h l l s o r p t c o s e q e t t t h r a p i d d s a p p e r a n c e m i g h t  
 n t f l t c e l l e s e p t i c t n p e r a t u T l i g h t c a l  
 m f l l t y p e n m m l n h l e s u m e d a n m a l p e a r c e  
 O t h f l l t w l e l e d t h t t h e i g h t b e t h r o m b o s f t h  
 l f t g l l t t v t e i g t o f t h n t h r i g h t m a t d  
 w p l l l t l u l t b e o f t h f l c t y p e A l l t h c e l l r e  
 d e l l n t a l s o u e u l t p a a b e t Th  
 s p o s e i f f w l l r e t h k e e o f t h u p p e r t u n t h e  
 a d f i t e f l h l l t N t l g w f n l g x t o f t h m b o s  
 l t h w l f t l t b e l  
 Th l f t n t d w t h x p l e d The wa o p e l a l t h g h t  
 l o o k e d l f f t f t n g o o d d t l t l e d f e e l n d t h  
 f e e l d l A p l w p l e d v e i t d t h w o n d c l e d  
 Th f l l g l y t h h l l g r l c o d t w o w m a r k e d l y m p e d  
 t h t p e t b e c a m n r m l t l f o r t h d y a f t e o p e t d h e  
 p l d t u n t l u l r c o v e r y

The first diagnostic difficulty in this case was in deciding which of the two mastoids to open at the first operation. The left mastoid was decided on because it has been the experience at the clinic that if ears are discharging and signs of otitic sepsis are present the seat of disease is usually to be found on the side on which is the most pronounced cervical adenopathy.

With the failure of a favorable response to the first operation it was necessary to decide whether the continued fever was due to the formation of a thrombus in the vein of the side which had been operated on or to sinus phlebitis on the opposite side similar to that found at the first operation. Although the discharge from the right ear had ceased and the membrana tensa

had resumed a normal appearance it was decided to operate on the right mastoid first because careful inspection of the side operated on gave every indication of its being in good condition. From experience with hemorrhagic mastoiditis it has been learned that sinus phlebitis might exist without suppurative disease of the mastoid process particularly in the diploic type. This can occur even when the middle ear appears to have become quite normal after an attack of otitis.

One factor which led to the decision to operate on the right side was that if the left vein was opened and sufficient pathologic change was not found to account for the symptoms it would then be necessary to open the right mastoid and face the added danger of opening the right sinus if it was involved inasmuch as it is generally considered necessary to allow an interval of time for compensatory circulation to become established between ligation of the two jugular veins.

The experience in this case shows the importance of hospitalization and careful observation. The early recognition of extension of infection to the blood stream is imperative if the condition is to be dealt with in what might be called a conservative manner. In this case as in others reported by one of us (Lillie) removal of the source of infection before thrombosis frequently obviates the necessity of interference with the venous sinus.

#### ACUTE FULMINATING SEPTICEMIA ASSOCIATED WITH OTITIS

A girl aged seventeen years entered the clinic March 29, 1928, complaining of tenderness over the right mastoid region. Two weeks prior to admission she had an acute attack of coryza of a mild type with a sore throat. In the next days a severe earache developed in the right ear which lasted for two days then the ear drum ruptured and the ear discharged copiously. In a day or so she noticed fulness, tenderness and pain over the right mastoid. The day before admission to the clinic she had a severe frontal headache with vomiting and chill followed by a temperature which rose to 104°F.

Examination showed the left tympanic membrane to be slightly red, edematous at the periphery and in the region of Shrapnell's membrane. The right canal was filled with a large quantity of creamy yellow pus and was swollen and costed in its entire length. There was an inferior perforation and some pulsation of the discharge. Quotable drooping of the superior wall of the canal was noted. On the right mastoid process the skin was slightly

ll g l r l n l o d at am unt f t l es o pr su  
 Ex m t f t l se n so h ry p l ry l larynx eg t  
 cept f g al z l s j et f th mucos m n l f th uppe es-  
 p t r t t l m t n of th h t l g a l l l m was g t  
 Th t y t w 1012 l A l u g os wa mal f cut ott mela  
 v l n t l t a l t a t l g l t y l l l th ph l l t of h m  
 r l g t y p e s e n t

Th put t wa l j t l l n f t l Cultur f th blood d  
 l s e l s col t 4 c c o l l u l m t l h r

O p t n th a l t n t l w p e l r e d t o l h m  
 l g t f f t l t w l u n l Th l g m m l f th r cell  
 l l g g l Th v r y f e e l l e e l g A m a l l q t y  
 f f e e l f l n t h c e l l Th c e l l w r n t e t e d a d t h t p  
 e l Th w u n e l a l l u l t b e n m l p p e r  
 n l t p l p t Th s l o l t h l r g b o t t h d f t h s b l e d  
 f r l l t h u a t j e d Th u n l w l g h t l y p u k e d e a r e  
 b e g t k t t c r u s e s t h s a f t h u d l o s e d l y  
 a t t f l g l

l l l g t l p t t l p t e t l k l t m l y l l n l t h t m  
 j s e t 105 l A v r l n w a g n f t t s t e e t a l t h  
 t t t t t t m p e r a t l l n l t h g e l a p p e n e e f t h p a  
 t t n j l d t h r l l y a l t p e r a t t h p a t e n t c o m p l e d l  
 l t h g h t k Th j t w a l l n a l t d b u t t h l e g t h e r  
 l l l t l l l l y n g t l h t a l l e h l b e c o m

l l A l g w a n l o l a c u t a t t t o f t h r g h t k n e e d  
 k l j t A t l t e n l u n w p e n w t h r p e t t o f t h m p r o  
 t t h g a l c o f t n l t h w l l l n t p e r a t r e A b l o o d  
 l t t k t h l y l t l p e r a t l l c o l f h l t t r e p  
 t c o e t 45 f l l o c l w a l l l Th t f t h h g h l r  
 t h f f t h d y l a t h t l o g e 00 c f b l o o d a

l l f m t h p a t t a l 50 c l l l o o d l m l w a g A  
 b l o o d l t u t h f t h d y l l o t h g o t h n f o t v e g h t h r s

A j l t l g l d t l w u l l t h t h d  
 d t h w l p p e l t b e n g o l c o d t Th p p e f t h p a  
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 d y h d l d t h l f t h w A t 5 m n t l t l f t h d a a l t r p e  
 e a t t l t t l u l l n l y t l l t h a s o m g d t y  
 o f t h k l l n l t n l e g l l y s e n l h b e c m t  
 p o r A j l p t l o t l f l d w l d t o o l g l p e u  
 t b e m d a s t g e h y l l a l e l u d y A d g n o s a  
 m l f u t e l r p l n g t T l e p t t f l l p d l y d d d  
 t l l 20 p

The principal observations at necropsy were acute suppurative otitis media with mastoiditis on the right side and acute cerebrospinal meningitis.

The severity and rapidity of the onset of symptoms the hemorrhagic type of disease and the positive blood culture without sinus phlebitis or thrombosis showed the presence of an intensely virulent infection. In other cases of this type immediate ligation of the jugular vein had not favorably influenced the course of the disease so was not deemed advisable under these circumstances.

It is not probable that a continuance of the transfusions on alternate days would have had a favorable influence on the course of the disease. The terminal meningitis was probably blood borne and too fulminating to permit of effective treatment. Spinal puncture early in the course of the disease might have afforded diagnostic data although only the somnolence and severe headache suggested meningeal irritation. With an infection of this type the prognosis is always extremely unfavorable however occasionally some of the patients get well. It is probable that the otitic disease was merely an incident in the septicemia arising from an acute upper respiratory tract infection because of the other evidence of generalized infection.

#### SPONTANEOUS BLEEDING FROM A NONMALIGNANT FAUCIAL TONSIL

A man aged fifty five years came for consultation because during the previous week the left tonsil had bled spontaneously. The amount of blood lost at any time was small but he had become apprehensive and had thought the bleeding was a sign of malignant growth. Symptom referable to the throat had not been present before the onset of bleeding.

Examination revealed an irregular papillary growth involving the left tonsil extending down to a third the lateral pharyngeal wall. It was not fixed. The surface was superficially ulcerated. A small lymph node could be palpated in the left submandibular region. Quite naturally it was felt that the lesion was malignant because of the age of the patient the appearance of the growth and the symptoms. However repeated biopsy was negative and at tonsillectomy it was seen that the capsule was intact. Careful examination of this case did not reveal any evidence of malignancy. The outstanding pathologic observation was the location of the cyst.

This same type of syndrome has not been encountered here before. Without pathologic examination of tissue removed at biopsy and later of the specimen one would not have been



## EFFECT OF THE APPLICATION OF RADIUM IN HYPERPLASTIC FRONTAL SINUSITIS

A boy aged fourteen years came to the clinic for examination with a history of having taken a severe cold following swimming ten months previously. At that time severe pain had developed in the supra orbital region with swelling, redness and tenderness in the same region. An external operation on the right frontal sinus was done four days after the onset of the symptoms. Immediately after the operation swelling, tenderness and redness at the inner canthus of the right eye and an external squint and proptosis of the eye occurred. There was continuous drainage of pus through a fistula near the mesial part of the incision. The patient then visited the clinic elsewhere where polyps were removed from both sides of the nose and an external operation was done on the right frontal sinus. For about a week following this operation there was drainage of pus through the nose in addition to that through the fistula in the external wound and then because of filling up of the nasal fossa with polyps the whole discharge came through the fistula in the external wound. A month later the patient was again operated on at the same clinic and at operation a communication was found with the left frontal sinus. This operation also was without beneficial effect; the discharge through the sinus in the right frontal region continued and polyps were removed from the nose almost daily. During the three weeks before admission he had had pain in the eyes and temporal regions which was eased by discharge of pus through the sinus in the right frontal region.

Except for large infected tonsils the examination of the pharynx, larynx and ears was negative. The right nasal cavity was completely blocked with polyps and there were several polyps springing from the region of the middle turbinate on the left. There was a scar in the right supra orbital region with a large fistula near the inner angle of the eye from which sprang elevated firm granulation like tissue covered with pus. There was a defect in the external table over the right frontal sinus and on probing a defect in the septum within the sinus could be felt. The right nasopharynx was seen to be filled with a polypoid mass. The pupils of the eyes were found to be equal and the reaction was normal. Vision on the right was 6/7 and on the left 6/7. Ocular movements were good even to convergence but there was a divergent squint of more than 35 per cent in primary position. Roentgenogram of the sinuses were reported negative except that the frontal sinus was very large on both sides. Biopsy of the tissue presenting through the sinus in the right frontal region was diagnosed as inflammatory tissue. Examination of the heart and lungs was negative. The Wassermann reaction was negative. A diagnosis was made of bilateral hyperplastic frontal sinusitis with external manifestation, involvement of the fronto ethmoid cell on both sides and possibly orbital abscess on the right.

It was decided to perform a two stage radical operation of the illness on both frontal sinuses. At the intranasal stage of the operation the hyperplastic and granulation tissue in both middle meatuses was thoroughly removed and the nasofrontal ducts were enlarged satisfactorily. The frontal sinuses were found filled with polypoid tissue throughout as were the fronto ethmoid cells which extended all around the upper portion of the orbit to the

apex Th x m l tall e f t th at m f th b e both  
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u u a l w a l p l t l u f t h p v u p e r a t e f f t w a t t m p t d  
th g h t l Th w u l h l l a s t f a c t l y x e p t th e g l f t h  
p h u n a f l l  
M t k f t th p e t n p o l y p b e g n t f i n b o t h d f  
th x l u l l b e s e e f m g n t h g h t f o t l a f f o n t  
t h m l l l t h p l t e p e r t e f f e c t th g h t T e e k f r  
l t 50 M g t u b e f l n w a t o d u c e d n t th n a f t a l d e t  
h l l l f t n p l c e l a n h o u n d 50 M g p l q u a s  
p l l l e t h f n t a l u s e s a l l f t l b h  
l l l l l t h l l t l f y f f e c t th p l l th th  
n x t l e w e e k l e 50 M g t u b e f l u m u p l d  
th f l l f t n x th l a n l l f r p l c e f t h u s  
f l l k h p l l t f l u m th m a k e d l t th  
t f l l l b o t h p p o l f t h n s e t h p o l y p w h m a e d  
k l l f l t h y d g n t g Th p o l p th g h t f r o t l  
u l s e e t h g l t g u f f e c t m a e d e d l b e f  
f l f g l t k i t a 50 M g t u b e f l u w p l c e d th  
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h u l l l t h t h p o l y p n t h f t l u b e g n t m l t y  
d u l k h l k n t g l l n e e A t t y a d m  
t x t k f t f t l t h s e f e t h f t  
l t a p p l e a f l u m l t h u p p e p o l f t h e s e w c o m p l t l y f e e  
o f l v e p l u l a n l a p p a g m m b a c o u l d b e s e e  
t h e g l t f l a d f n t o t h m l c e l l t t h p e f t h b z l t  
a l e d e d t n a t t b e c e r t n t h t h u l l b e e u r e e  
l p o l y p n l t t p e n g f t p e r t e f f e c t a c o e d w t h  
f l a l w t h k l u l t l n a p e f e c t e l  
M t w d g f t h f t l u s a l f t e t h m l c e l l  
b o t h d w t h a p l t n x l f t h l n g m m l t h g o o d r e  
l t f t h e p e t n w a n g d b y t h p l e c u r e c o f p o l y p  
t h u p p e p o l f t l s e l n t f n t a l u l t w a t h r e l e e s s  
a y t v a r y t h m l f t t k n l b y t h u s e f l u m t e c o m p l h s u h  
l t t t f t l c g p o l y p o l g t h a u g e a l m a l a b l  
t f t t

# SCARRING AND ULCERATION OF THE NECK AFTER IR RADIATION RECONSTRUCTION OF THE UPPER LIP AND CHEEK RECURRING CYST OF THE FLOOR OF THE MOUTH KELOID OF THE NECK OSTEOMYELITIS OF THE JAW FIBROSARCOMA OF THE HYPOPHARYNX

GORDON B. NEW

## SCARRING AND ULCERATION OF THE NECK AFTER IRRADIATION

Case I—A girl aged fifteen years came to the clinic January 24, 1929 with a roentgen ray burn and ulceration in the left submaxillary and upper cervical region. About four years previously there had been a swelling in the left submaxillary region which was drained. A diagnosis of tuberculois was made. Twenty-two roentgen ray treatments and three radium treatments had been given since that time. In the last few weeks there had been some swelling in the region of the scarring which had caused almost complete ankylosis of the lower jaw.

Examination revealed an inflammatory mass in the left submaxillary and upper cervical region with a thickened scar about it. The scar was in the midline just below the angle of the jaw in the center of the scar about 2 cm in diameter (Fig. 37). This was fixed to the margin of the jaw. There were small palpable apparently inflammatory lymph nodes below the ulcer in the neck. Analysis of the urine showed amount 450 cc, specific gravity 1.015, reaction acid, albumen 0 and sugar 0. The hemoglobin was 80 per cent, erythrocytes numbered 5,100,000 and the leukocyte 10,500. The Wassermann reaction of the blood was negative. The tuberculin test was positive. A diagnosis of ulceration and scarring caused by irradiation with secondary infection and cellulitis was made.

Hot compresses were recommended in an attempt to reduce the acute inflammatory condition and later wide excision of the entire scar to be replaced by a flap from the back. Under hot compresses the inflammation condition gradually subsided and the patient was able to separate the teeth and move the jaw. February 8, 1929 a tubular flap was made on the left side of the back about 17.5 cm long to replace scarring in the left submaxillary and cervical regions (Fig. 38). The ulcer was excised in the left submaxillary and upper cervical region. This proved macroscopically to be inflammatory calcareous necrotic tissue. The tubular flap healed well and the patient returned July 1, 1929 for excision of the scarring to be replaced with a pedicle flap from the back. The distal end of the flap was cut away and after the central area had been excised it was sutured in place. The left submaxillary region replaced the thickened scar and broke down again (Fig. 39). The



1st stage of the plate was completed August 12, 1909 when the flap was completely turned up. The final ulnar length was 14 cm. The wound in the back closed (fig. 40).



FIG. 37 (Case 1).—The ulcer at the angle of the jaw and the inflammatory mass with pus hanging from the ulnar length of the completely closed.



FIG. 38 (Case 1).—The tube flap turned up and the back closed.

The patient's first treatment (1). The patient had a that was going for what was apparently tuberculous. The ulcer at the back of the neck had resulted. It was used that the

excision of the lymph node might have saved the patient considerable scarring and deformity. (2) The acute inflammatory condition with complete



FIG 39 (Case 1) —The distal end of the tube flap replaced the upper part of the scar

ankylosis of the jaw at the time of the first examination made it difficult to determine whether the condition was inflammatory or malignant secondary



FIG 40 (Case 1) —Completion of the suturing of the flap after excision of the scar

to the breaking down of the scar. Malignant changes in scars following irradiation frequently occurs. Hot compresses and wide excision of the lesion

ght back 1 11 n sel Th nth f eh a l w gl ced w th a  
full th kn g ft Aft th flap h r l m d s p l c e f tw week t  
w cut f pl ed n th f l a l Th l t p l a t p o c e d wa  
l n F b r u e y 4 19 8

Th p t n t 1 1 N v e m b e r 6 19 9 Th l p w a h r t e n d  
n l th n g l f th m u t h w n l a g d l y p l e t g th n g l l a t l l  
n t th l e e k f u t u g th m u c o u s m e m b r a u t t o th k (F g  
4 n 143)

At th p s u r i m i l u s e f p a t e s a n d p l a t n t h t a t m e n t f  
b e g n f n t j u k s e e m s t b e a c o m m n g o c c u r e C m a f  
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l m t u n l f f B a l c e l l p t h e l m a h t a r t th k d  
m f t t l u p p e l p f m t h d e s c r p t n f t h e p m a r y l e s h  
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m t l b e t l d a m t h f h w v e t h e p t t a m a t h  
f h d t h f l l p l e t b t a n f p a t h p o t t h m a y b e  
u s e l t t h w g n d a f u l l t h k g a f t h c h p l a c e s t h e a  
h h h t u w u l l d t f m t h l p f t h p e s t d a y c o m  
m t l a s e l t m a k m l l n m a g n w a l t h c a s e

### RECURRING CYST OF THE FLOOR OF THE MOUTH

C a s e I I I — A w m n g d d l r y - o n j r m t t h e l O c t b e  
11 19 1 f e c u g c y t f t h f l o o f l l m u t h f f r e m t h d a  
t f l l l e e v e d l y p l f a l h l l t h b e f  
m t t h t l h a d l m e d l h d b e e p e d s e r a l  
t

t w l l y t n t h f l o o f t h m u t h t h t r a l  
f f t h t j u b u l g d f i l l g n t l a b e t w e t h e t p o r t f  
t h t g f t h p o t r l f t h l w e p o

Th p t w p e t d n O c t b e 15 u n d t a t h l g a e s  
t l W t h t h t g u t e t e l t t h m u t h t h c y t d l y  
p o s e d f w l o t 8 m n d u m e t n d e x t d f l b o t 5 m b k  
d h h t g t t l f t d Th l l o f t h y t s e d t h  
f l o o f l t h t h b y p k g u p t h w l t h t m h f p s  
a d f u t h u t n t r a d a l b m u l l r y g t w p o b l t  
x p o s e t h t l n g f t h y t B y m a o f a s m l n e e d l u s e d t h  
u g l l t h v t r p o b l t o d s t y t h e t l g f t h c y s t  
t h u g l l T l l l w t h b u g h t t o g t h w t h t g u t d a m a l l  
d f b u i k s e t e d t t h b a s e f t h e p o c k t Th p t e n t  
c o v d t f u l l d w d m s e d f m b s e r v a t n t w k l t  
w t h t h u d t h m u t h p e t B y l a l d

C y t f t h f l o o f t h n u t h m y b e o f v a u t y p e Th m t d f f  
c u l t t t k f t l m u l t i c u l c y s t w t h e r y t h l l Th  
t y p e p l b l y g t f n m g l d S g l m a l s a m t m

difficult on account of the thin wall and the fact that the wall tears easily in a manner similar to the tearing of wet tissue paper. Exposure of the entire cyst is not difficult by the method outlined though gives a much better chance of permanently eliminating the lining than any other method I have used.

### KELOID OF THE NECK

Case IV—A woman aged thirty six years came to the clinic May 17 1979 because of a keloid on the left side of the neck. She stated that two and a half years previously she had received a wound in the neck in an automobile accident. Since that time the scar had grown gradually. She had not been treated.



FIG. 44 (Case IV)—Keloid of the left side of the neck.

Examination showed the keloid to be about 12 cm. long and 2 cm. wide (Fig. 44). In view of certain results obtained in a French clinic it was thought advisable to treat the lesion with surgical diathermy. May 18 1979 this was applied as small needle point being used. Following the treatment the wound healed and an excellent result was obtained with no tendency to further formation of keloid (Fig. 45).

The treatment of keloid without the use of diathermy was best taken care of by radium used in direct contact with the keloid except for 1 mm. of lead used as protection. Improvement after treatment by radium of a large lesion however is slow and the treatment should be repeated for a considerable period. The use of diathermy seems to be of distinct advantage and has



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g s sat f t It Rad n g t be t s l th case t com  
p l t th ooth g ut of tl w s r

### OSTEOMYELITIS OF THE JAW

Case V — A m k l th ty n y a m t th l J ry 6  
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l l h l t x t l h ght l n l l f th g m  
sed th l s f t n w l l g o c u e d l p g e s s e l p d l  
w t l p o t l w n l f y n w l t l b m a l l r y  
g o t l n l f y f x l g t a l l h l b o t h l d t  
l t h l t h t t l t t g h t l f t h l j w b e c a m  
l o t h w k f t t h s e t t l l l c u l l t e e t h r  
n l d l p f b o m w s  
A t h t f w a n t t l w n n l l m t r y m o l a n g  
t l g h t l f t h l j a l t l u l l l r y g v t h c o l b f  
d u t Th g u t l l w t h a l c h a g g t h g h t  
l f t l l l f t l m u t l f w h l t h p u c o u l d b e e s s e d  
d l y A o c t g g n f t h a l t l w j w v e l d t e d  
t r u t t h g f t l b o d y l a s c l g r u (F g 46) O c  
c u t f t h x t n l t u a l t l n t l t n p p e f t h m a  
g o f t l b o t h p o l i t y f f u l m t l m l g a n v w a c o l e d  
a l t h g h t h l t r y g s t l t n y l t t l m t l b l c o l t  
J a n u a y 8 1927 d g d v l a t n w d T a  
m d f m p e m t n h h d l n t l o k n l g t l p l

microscopically to be inflammatory. Thorough drainage was established in the mouth. Drainage on two other occasions in the next two months was instituted both inside and outside the jaw. Several pieces of sequestrum were



FIG 46 (Case V)—Extensive osteomyelitis of the body of the lower jaw with pathologic fracture very little bone remains on the right side (retouched roentgenogram)

removed the last one June 2, 1929. The roentgenogram February 1, 1928, revealed the excellent result of the regeneration of the lower jaw following such an extended case (Fig 47).



FIG 47 (Case V)—Regeneration of the right body and ascending ramus of the lower jaw (retouched roentgenogram)

The cause of such a condition as occurred in this case in the treatment of acute abscesses of the teeth is usually the



ment. The tumor however gradually disappeared. Treatment by roentgen ray was used outside the neck. The patient was unable to return until August 16, 1929, when there was no sign of the tumor. The tracheotomy tube was removed and the fistula was closed. He had been able to cork the tube however for about one and a half years previous to this.

This type of tumor is similar to those seen in the nasopharynx. Microscopically it is fibrosarcoma but clinically it is a benign tumor since it does not metastasize. If it is in the

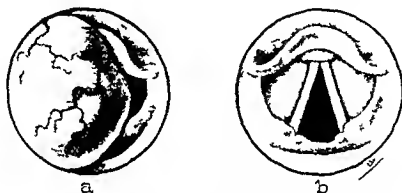


FIG 48 (Case 11)—a Fibrosarcoma of the right hypopharynx b drawing two years after preliminary tracheotomy and insertion of radium into the tumor

nasopharynx it may produce death by direct extension and if it is in the hypopharynx as in this case by causing dyspnea and dysphagia. Radium or surgical diathermy seems to be the ideal treatment for these tumors. Surgical removal is usually associated with considerable bleeding and some mortality. Radium when used is best inserted directly into the tumor and gives excellent results.





**MULTIPLE PIGMENTED PAPILLARY NEVI OF THE FACE  
 PIGMENTED MOLE OF THE FACE RECURRING EPI-  
 THELIOMA OF THE FACE INFLAMMATORY EPULIS  
 FIBRO OSTEOCHONDROMA OF THE MANDIBLE**

FREDERICK A. FIGI

**MULTIPLE PIGMENTED PAPILLARY NEVI OF THE FACE**

Case I—A girl aged fifteen years came to the clinic May 28, 1928 with multiple extensive pigmented papillary lesions on the left side of the face and scalp (Fig. 49). These had been present since birth but not recently



FIG. 49—Multiple pigmented papillary nevi of face

increased in size and we were not producing symptoms. The patient was given advice regarding the emotional factors in cosmetic lesions. Excision with primary closure and skin graft was advised.

The patient returned for operation October 24, 1928 and under local anesthesia the most conspicuous of these lesions was excised. The lesion extended from well up on the anterior portion of the scalp down over the forehead of the forehead through the brow and across the inner portion of the upper eyelid and the root bridge and ala of the nose on this side. The por-



Treatment by irradiation for lesions of this type is unsatisfactory because of their radioresistant character and the possibility of inducing malignant change. Destruction with the actual cautery, carbon dioxide snow or electrocoagulation is likely to produce excessive scarring and little cosmetic improvement. Sharp excision is the treatment of choice since it permits of primary closure of the portions of the wound whose edges can be approximated and immediate skin grafting of the wider areas. Skin from the inner surface of the upper part of the arm is preferable for grafting on the face as it is thinner than either that of the abdomen or thigh and bears less hair than that of the thigh. Because of the conspicuous scar following the removal of such a graft from the arm however many patients request that it be taken from some other area. There also seems to be a somewhat greater tendency for grafts of thick abdominal skin to become pigmented.

#### PIGMENTED MOLE OF THE FACE

**Case II.**—A girl aged twenty years came to the clinic June 1, 1941 on account of a large pigmented mole on the left side of the face. She had



FIG. 51.—Pigmented hairy mole of face.

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 nea u g l w ut 4.5 by 8.5 cm cou l not be closed p maly and w co  
 l w th full th ck k gr ft tak n f n th l ft d of th abd m  
 Th g ft took pe fctly a f th m n l of the w un l h led n cely Th  
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 f rm t f k f f f w week f t n f an applicat n of radum as  
 g ren d rectly t

Ma l 4 19 2 th pat nt tu ned f rem val f th papillary gro th  
 n th l ft l k t mpe l a l y a ul r g Und filtration s



F 50—Lat t (F k 49) f ll ng x n nd f ll th k ss k graft

th th l w s d sected ff an l tl l a l po t gl of th  
 und tu d A la ge t ngul a a ma ed neccs tat g k  
 g ft Th s c ed w th a full th k graft t ke f m th e s  
 pe t f th l ft tl g P maly heal g f th w und d gr ft took pl ce  
 w th tl f l u l h w n Fg 50 Som p gme rat n f the k  
 graft th f h l d l p d afte f w mo th but th gr d ll  
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 m t t n f l tl sequ n

Not ly h tl f t nt appea nee mp ved ma k dl but h  
 n t l att tud h p ved R m al l l n f th type d bl  
 t nly f m t t nd po t but lso becau f the f ge f p  
 th l mat u l g t Such l n t f q tlv beco mal g  
 n nt en y u g pe so

Treatment by irradiation for lesions of this type is not satisfactory because of their radioresistant character and the possibility of inducing malignant change. Destruction by the actual cautery, carbon dioxide snow or electrocoagulation is likely to produce excessive scarring and little cosmetic improvement. Sharp excision is the treatment of choice since it permits of primary closure of those portions of the wound whose edges can be approximated and immediate skin grafting of the wider areas. Skin from the inner surface of the upper part of the arm is preferable for grafting on the face as it is thinner than either that of the abdomen or thigh and bears less hurt than that of the thigh. Because of the conspicuous scar following the removal of such a graft from the arm however many patients request that it be taken from some other area. There also seems to be a somewhat greater tendency for grafts of thick abdominal skin to become pigmented.

#### PIGMENTED MOLE OF THE FACE

Case II—A girl aged twenty years came to the clinic June 17, 1921 on account of a large pigmented mole on the left side of the face. This had



FIG. 51.—Pigmented hairy mole of face



ing 52 — Pat t (t a 51) t il ng  
n an l l l th kn s al n graft.



... with full thickness

l p e s e t      l t l u t h i n t f d u c t s y i t      Th pat t d  
a d e m o v a l b e      f r i p e r      B r u t t s f s d  
e l n y r t h i      l l b c t t d b o r t u t y f e t m t h b o n

dioxolene with some improvement. A year prior to examination in the clinic an antid had been applied with the production of areas of whitish scarring.

The lesion was a thick pigmented hairy nevus covering the left side of the nose most of the left cheek and the outer portion of the upper lip. It was elevated above the level of the surrounding skin and produced marked disfigurement (Fig. 51). Whitish scarring due to previous treatment was present over the bridge of the nose and the upper part of the cheek and rendered the lesion more conspicuous. On account of the irregularity of the surface excision and skin grafting was advised. This was done in three operations under local anesthesia at intervals of approximately one month. The skin grafts took nicely; the result is shown in Fig. 52.

### RECURRING EPITHELIOMA OF THE FACE

Case III.—A man aged forty-eight years came to the clinic November 27, 1938 because of an ulcerated lesion on the left frontal and temporal



FIG. 54.—Recurring epithelioma of face.

region. This had first appeared as a small elevated growth in the temple region about twenty years previously. In the course of time it had enlarged and become progressively larger. The repeated measures had consisted of ointments of roentgenium but the lesion had only temporary improvement. Examination in the clinic showed a large ulcerated lesion on the brow, frontal and temporal regions (Fig. 54). It was about 7 by 9 cm. in spite of the deep ulceration it had not yet attached itself to the bone.



ly gion Clin ally types I to be an epitheloma. Biopsy showed it to be basal epitheloma. Volume 29 1934 cut by  
 scribed uterine lesion. The woman was 1 ft 6 in tall  
 f. 15 lb. ft. 11 in. uterine mass had been passed and the base  
 of the lesion was 1 in. many distal cells. The woman  
 with a full thickness skin graft taken from the upper part  
 of the thigh. The graft took perfectly so that no further pressure  
 dressing was necessary and was not by itself. Fig  
 55 shows the patient two weeks after the application of the  
 graft. The patient has been healed. The patient is  
 content.



Fig. 55—Patient (Fig. 54) 1 k ft d full thickness skin graft

A lesion of this type might be taken care of by means of electrocoagulation, radiotherapy, or sharp excision. I believe, however, that cautery excision followed in a few days by a full thickness skin graft possesses distinct advantages. Use of the cutting cautery diminishes danger of grafting, and since there is comparatively little bleeding the limits of the lesion can be readily determined and clean removal more easily effected. The technique of destroying such a lesion with electrocoagulation is simple and can be carried out under local anesthesia but slowing of the wound results which is extremely slow in healing. The

use of radium or roentgen rays often results as in this case in only temporary improvement with subsequent increased activity of the growth. If skin grafting is deferred for several days after excision of the tumor one is enabled to determine the extent of the cauterization so that the devitalized tissues can be removed readily. In the cases treated in this manner there has been very little bleeding following the debridement which greatly facilitates suturing of the graft in place and increases its chance of taking. With careful asepsis quite as high a percentage of takes should be obtained in grafting such areas as in the immediate grafting of fresh sharply incised wounds. This method of treatment offers the decided advantage of hastening epithelization of a wound which otherwise would be slow in healing probably requiring several months. Also the grafted surface withstands trauma quite as readily as normal skin whereas the tense thin scar resulting from healing by granulation in a wound of this extent remains sensitive for a long time and is easily traumatized. The procedure is of course not advisable in cases of active epithelioma or in those in which the limits of the growth cannot be definitely determined and excision cannot be carried widely into normal tissue.

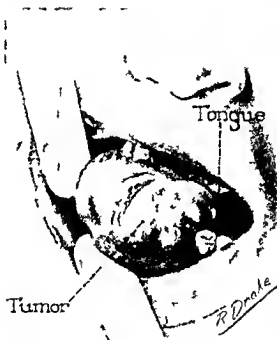
### INFLAMMATORY EPULIS

**Case IV**—A man aged fifty four years came to the clinic October 12 1928 giving a history of having noticed a small painless pedunculated tumor on the right lower alveolar process in the buccal area about fourteen years previously. This was removed surgically with a year but recurred promptly. It was again removed three years later and remained well for five years. Six years previous to the patient's admission to the clinic the tumor again recurred and two years later was accidentally broken off at its pedicle by a severe blow on the jaw. Further recurrence immediately developed and during the few months preceding examination in the clinic the growth had increased in size rapidly and had bled at frequent intervals. The patient had no general complaint except for recurring attacks of pain and swelling involving chiefly the upper extremities.

Examination in the clinic revealed a large pedunculated tumor on the right lower jaw overlapping both sides of the alveolar process much like a saddle so that the pedicle could not be seen (Fig 56). The tumor extended from the central incisor region well into the molar area and measured about 2.5 by 3.5 by 4.5 cm. It bled readily on the slightest trauma and clinically looked like an active sarcoma. Because of its size it interfered with complete

occl on an lth s per r t face l t l t t fth ppe teath A  
e larg d lymph nod w p se t m t l t l l r y r g both des  
Th ewa mark l l talsep Aroe tg g m fth ghtma dble h d  
a tch d lfect in t l l ol r lo le at t l t fth t o d m l t pl  
pe l t lalsee se (Fig 5)

Ge ril xa n t l w l rked l ty m l l hype t m  
l l l l m n l t nff m t y p o c e n y l g both h d d  
botl w t Th l t l l t a l g o c l c t g t F l l  
i g t u l s l c e th p l l f t l t m l t t h m e t th j  
co gul t l w th r g c l l a th y a l t h g th a l f t e d f f th t



11 56—[ l l t r y ( t t n ) ] l l f k h n l l l

l f bloo l T t l l t l t l l y g t l t e l f t d  
ut t the s me t M s c p m t h l t h t m t be a  
ch n flam uat y g l l l f f i b c c t e t u d  
l l l el M y pl l l w c u t t e d th g h t t h t d  
n t l e f f t t w p o l y p l u l e l k y t e s d h m  
ph y t Th p t t l w b e f r f r f t h  
ve

l t l t l l g l t r y t l t t th p e d l t l h a t  
l p u l y l w g w th f t h t d f i t l y g g t d p l  
lt t p l l r g m t e l c l p p e t l l s c t d

pain bleed ng on slight trauma and the enlargement of regional lymph nodes seemed to indicate sarcomatous degeneration. The microscopic picture of chronic granuloma however revealed its development as the result of chronic irritation. The marked dental abscess present in all probability was the primary etiologic factor. The acute inflammatory reaction in the tumor undoubtedly accounts for the ease with which bleeding followed slight trauma. Coagulation of the bony attachment of the growth together with clearing up of the dental infection should prevent further recurrence.

The roentgenogram is of interest since the notching of the alveolar process shown is apparently due in part to pressure absorption resulting from



FIG 57 —Pressure absorption of right mandible and dental displacement due to inflammatory epulis

slowly growing tumor. This same pressure effect is also evidenced by the flaring of the upper portion of the adjacent carious teeth.

### FIBRO-OSTEOCHONDROMA OF THE MANDIBLE

Case V —A married woman aged forty three years came to the clinic October 28, 1929 with a recurring tumor of the left lower jaw. A crowned molar tooth had loosened spontaneously and had been extracted about one and a half years previously. Shortly afterward painless enlargement of the jaw developed at the site of extraction and increased progressively. About nine months prior to examination this tumor which had become large enough to produce some external bulging of the cheek had been removed surgically. Microscopic examination of the tissue was not made at that time. About a month before registration in the clinic the patient noticed recurrence of the tumor and it had since grown with increased activity.

I at l l t f mly l r l lightly od la  
 n ulcer ted l g t f th l ft ma fill t l g from th fist  
 l cup l g n t th gl d m k lly bulg g both th l t l nd  
 l gul l j ct All f th teeth th ex n w m g Th t mo ex  
 t n f l w f t l th l l f th al eola hor r but tt a s fi t  
 t t t t f w th ocl n Th r w local t d n Th su  
 f l tl m j se l s o g l lly into th t f th d g mal bo  
 t t t a l f f u l t l t m t l m t o g n r l x m t Scarr g  
 t t l t f th f p e t e p s e l w f t th f ce  
 w l ch w a co ed th th r w s e n m l m cou m b Th e no  
 l a g m t f th g n lly pl odes Th p t t w ma k edly bese  
 A rease w p s e t th l r t m t Roe t g o g m l the



FIG 58—Fl o teoch d o f l ft m l bl

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 f th h t l so th t ly a very ro b lge l r mal bo re  
 d al g it l w bo d (l g 58) Th oe t g gram l th t m  
 gg t l be gn pl m p t f th b t ry of cre d rap d ty f  
 the g th l pl t w l sel d th wa ca d t u le t  
 t ch l thes Oct be 21 1929 B p y ho l th t m t be  
 f b t och l m C l y th t w l f m som h t el t  
 r u l b e r y c t c l d ly e d w th l g ett l t  
 g u l r t l l f adh c t the ur d n g bo t geth r th  
 th fa t th t t h l l troy d app mat ly th ce fo th l th m  
 th ma fill e l ed d s l l n t t p t t m r l s t t bec use f  
 th po b l ty l f ct M t f th t m h l l t l ly b t  
 a t f f p a r t w l f i t d th c v t th n t w d

was coagulated superficially by means of diathermy (Figs 59 and 60). A thin shell of sequestrum will probably form as a result of this cauterization but the prognosis as regards recurrence and normal function of the mandible should be good.

Tumors of the mandible other than those of epithelial origin always present an interesting diagnostic problem. Inflammatory and neoplastic growths originating in the soft tissues may at times be of such hardness and so intimately attached to the jaw that only by means of the roentgen ray can their extrinsic



Fig. 57—After removal of the fibro osteochondroma of the left mandible (Fig. 58)

character be determined. Actinomycosis and lymph nodes which are involved by metastasis often present such a picture. Besides the tumors common to bones in general there is a group of specialized neoplasms originating in dental elements and found only in or about the jaw. Among these may be mentioned the solid and cystic odontomas. Adamantinomas also occur more frequently here especially in the lower jaw than in any other portion of the body but they may develop at the base of the skull in association with Rathke's pouch and in rare

instances elsewhere. General examination alone may not permit of recognition of these tumors except in the case of certain superficial cystic odontomas and a group of the adamantinomas. The latter often present multiple fluctuant areas with firm tissue interspersed. The roentgenographic appearance of this group of tumors however is diagnostic.

Osteogenic tumors range from the very inactive to the extremely malignant types. A huge osteoma may be present for a number of years and not give trouble aside from the deformity



Fig. 60—Section of bone tissue (X 5)

it produces. An osteosarcoma on the other hand may attain the same size within the course of a few months and also metastasize extensively into the thorax or elsewhere. Often the history is of very little value in determining the activity of such a growth for the patient will frequently insist that a benign osteoma that has unquestionably been present for a number of years has developed only recently. The roentgenogram is of great value in determining whether bone forming tumors are benign or malignant. Aside from the difference in density there

is a tendency for the spicules of bone in benign tumors to arrange themselves longitudinally that is parallel with the long axis of the bone whereas in malignant tumors they are more likely to be arranged irregularly or radially that is perpendicular to the long axis. In slowly growing tumors originating in the bone there is also a tendency for a shell of increased density to develop about their periphery but rapidly growing tumors destroy the bone equally in all directions and often present a border that has a moth eaten appearance.





## CARDIOVASCULAR REFLEXES

J. MARKOWITZ AND FRANK C. MANA

In a previous clinic on the physiology of cardiac resuscitation it was pointed out that the prime essential in resuscitating a dead heart is to provide suitable intracoronary pressure. In order to resuscitate a dog that has been asphyxiated to death it is necessary to give a rapid intra arterial transfusion. The rate of injection if possible should be such as to raise the arterial pressure to about 80 mm. of mercury. It is a distinct advantage to add epinephrine to the transfused medium. The animal in the case represented in the tracing (Fig. 61) was bled to death. When the blood pressure was zero and heart sound were not heard the animal was pronounced dead. Eight minutes later under artificial respiration by means of intratracheal insufflation of air it was given an intra arterial transfusion of 500 c.c. of heparinized blood containing 1 c.c. of solution of epinephrine 1:1000. The dog weighed 20 kg. The transfusion as may be seen in the tracing raised the blood pressure but failed to cause the heart to start beating. A ureteral catheter lubricated with petrolatum was then passed down the jugular vein into the superior vena cava and the blood was siphoned off. This blood was repeatedly transfused intra arterially under pressure. The object of draining the superior vena cava is to prevent overdistention of the right side of the heart. A distended heart is more difficult to resuscitate and the survival period of a once distended heart when perfused out of the body with Locke's solution is distinctly less than normal.

In spite of the fact that the blood had been circulated three times in this manner the heart failed to resume its beat. At this point the trick was adopted of causing the blood to circulate by rhythmic compression of the animal's sternum about



QUESTION: Schafer's method of artificial respiration would accomplish the same as your traction of the sternum, would it not?

ANSWER: Yes. There can be no question that by far the best way of giving artificial respiration is by Schafer's method since it not only circulates air in and out of the thorax but also pumps blood in and out of the thorax. Occasionally Schafer's method is inapplicable as in cases in which the respiratory passages are obstructed. It is not uncommon in dogs for the epiglottis to become impacted against the false vocal cords so that the trachea has to be intubated to allow free access of air.

QUESTION: Then why are you using intratracheal insufflation as a means of artificial respiration in your experiments?

ANSWER: Only because it is convenient. It also provides a means of maintaining an extremely uniform grade of ether anesthesia since the ether gets to the pulmonary epithelium irrespective of the state of the animal's breathing. Later I shall demonstrate some cardiovascular reflexes. The subject is by no means thoroughly worked out but enough material has accumulated during a period of more than eighty years to make the consideration profitable. The subject will be presented rather diagrammatically. It is often impossible to elicit a single reflex by itself. The interrelationhip is so highly developed that a stimulus to one nerve instead of eliciting one response may bring forth a number of reactions which may make analysis of an individual response difficult.

Cardiovascular reflexes are chiefly concerned with maintaining proper intra-arterial, intravenous, and intracardiac pressure. By far the most important of these is the maintenance of suitable intra-arterial pressure.

QUESTION: Why is it important to have suitable intra-arterial pressure?

ANSWER: First the heart fails to get adequate circulation through the coronary system when the intra-arterial pressure is low. Second the center in the medulla and to a lesser extent higher up in the brain are seriously injured by the deficient flow of blood which results from low arterial pressure. Third, it has been shown recently that the permeability of capillaries is markedly increased by a physical factor of the structure. When the capillaries of a frog are perfused with oxygen-free Ringer solution the permeability for fluids many times that normal. When the arterial blood pressure is low the amount of blood circulating through the tissue each minute is considerably less than it should be and the tissues become aphyxiated. A vicious circle could readily be set up in this manner. All a familiar with the concentration of blood that occurs in surgical shock whatever its cause. The low blood pressure is therefore serious to the heart to the central nervous system and to the tissues. In each of these the tendency of a low blood pressure is to start a vicious circle. There is however one more function to blood pressure. Up to now it has been taken for granted that the only function of blood pressure is to provide the tissue with a definite quantity of blood for each unit of time. There may be other important things in having blood offered

the student find that the latent potential of the oxygen is probably much greater when the oxygen is added to the preparation. However, the blood pressure is not low.

On the table before us is an etherized albino rabbit. Its ears have been shaved. The carotid artery is connected to a mercury manometer and the connecting tubing is filled with an anticoagulating solution. In small animal like rabbits it is better to employ a solution of heparin. Alongside the carotid artery are two slender nerves and one stouter one. The stouter

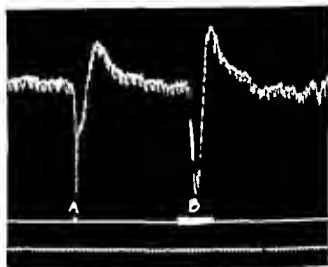


Fig. 62—Effect of stimulation of the vagus nerve on the blood pressure. At A the vagus nerve was stimulated with a glass electrode. At B the vagus nerve was stimulated with a glass electrode. The blood pressure fell to a level below the normal level. The blood pressure returned to the normal level after the stimulation was stopped. The blood pressure fell to a level below the normal level. The blood pressure returned to the normal level after the stimulation was stopped.

one is undoubtedly the vagus. The two slender ones are the cervical sympathetic and the so called cardiac depressor nerve. We shall stimulate each of these in turn electrically and observe what happens.

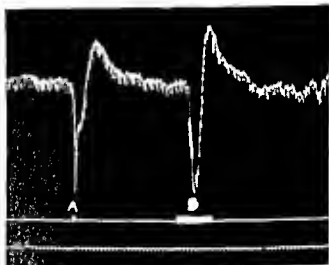
We are now stimulating the left vagus nerve. There is a prompt fall in blood pressure (Fig. 62). The heart has ceased

to beat for two seconds as is indicated by the fact that the writing needle is not oscillating. As the stimulation continues the heart gives an occasional beat and the blood pressure is recovering in spite of continuous stimulation. The heart is now beating at a rate which is slower than normal and the blood pressure is almost back to normal. This action of the vagus nerve was discovered by the Weber brothers in 1845. The resumption of the heart beat in spite of continuous stimulation of the vagus nerve is called vagus escape. At the time the Weber brothers announced their discovery it was received with incredulity because it was incomprehensible that stimulating a nerve could inhibit the muscle. All previous experiences had indicated that stimulating a nerve caused a muscle to contract and until recently this peculiar action of the vagus nerve has received no explanation. It is now supposed from the work of Loew and others that the vagus nerve does not act directly on the cells of the heart muscle but that it functions indirectly by liberating a hormone in the heart the function of which is to stop the heart. In other words inhibition of the heart is brought about by a drug and not by a nerve impulse.

Pilocarpine physostigmine digitalis choline and more especially its acetyl derivative acetylcholine will act to slow or stop the beat of the heart. We want to give the evidence that the action of the vagus nerve is to liberate a compound in the heart muscle the function of which is to slow or stop the beat of the heart. A frog or turtle heart is perfused with Ringer's solution by means of a cannula in the aorta and the branches of the aorta between the cannula and the heart are tied. The apex of the heart is cut and the Ringer's solution is collected. This Ringer's solution is perfused through a similar frog or turtle preparation. The two hearts are said to be perfused *in tandem*. The vagus nerve of the first frog is stimulated in the neck. The fluid that drips from the heart during this period of stimulation will slow or stop the beat of the heart of the second frog. The experiment may appear rather artificial but it should be pointed out that this vagus hormone is unstable in blood and rapidly disappears in this medium so that in about fifteen seconds a

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On the table before us is an etherized albino rabbit. Its ears have been shaved. The carotid artery is connected to a mercury manometer and the connecting tubing is filled with an anticoagulating solution. In small animal like rabbits it is better to employ a solution of heparin. Alongside the carotid artery are two slender nerves and one stouter one. The stouter



Fc 62—ff t f t m l t of th gu r o th blood p s  
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gu c pe Th t m m k r c o d e r y fi seco l Th gn l  
ma k lo th l s c l Th s g m e t d t cal ll b  
seq t t g

one is undoubtedly the vagus. The two slender one are the cervical sympathetic and the so called cardiac depressor nerve. We shall stimulate each of these in turn electrically and observe what happens.

We are now stimulating the left vagu nerve. There is a prompt fall in blood pressure (Fig. 62). The heart has ceased



FIG 63—Effect of stimulation of the cephalic end of the left vagus nerve in a rabbit both vagus nerves have been cut there is a marked rise in blood pressure

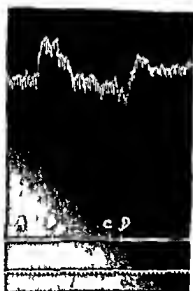


FIG 64—Effect of tying and cutting the right and left vagus nerves respectively on the blood pressure of a rabbit. At A and B the right vagus nerve was tied and cut. At C and D the left vagus nerve was tied and cut. In each case there is a temporary rise in blood pressure. This rise is usually attributed to the accelerated heart rate following section of the vagus nerve.



human being, which lies dorsal to the carotid sheath and in front of the longus capitis and longus colli muscle. If the ear of the rabbit are held up to the light, some idea will be obtained as to the function of this nerve. It may be seen that as the cervical sympathetic nerve in the neck is stimulated the corresponding ear becomes paler than the opposite ear. The number of vessel distinctly visible is much less. It may be noted also that the pupil of the corresponding eye dilates on stimulation. The nerve is now cut. The vessels in the corresponding ear are widening. The ear is distinctly redder and the number of visible vessel is much greater. It may be concluded that one function of the cervical sympathetic nerve is to regulate the caliber of the vessel in the head and face. The nerve is continuously constricting the vessels that is the vessels are continuously receiving tonic constrictor impulses from the vasomotor center by way of the cervical sympathetic nerve. The nerve has an interesting history. It was discovered by Claude Bernard in 1852. By means of just this experiment it has been shown that surgical shock is not due to exhaustion of the vasomotor center. In a rabbit that is deeply shocked it is possible to show that section of the cervical sympathetic nerve still results in considerable vascular dilatation of the corresponding ear.

The third nerve is the cardiac depressor nerve. It should be called simply the depressor nerve. The term cardiac depressor implies that it depresses the heart which does not mean anything. The nerve is afferent beginning largely in the aortic arch and coursing upward to the vasomotor center. The name cardiac depressor was given to it because of the mistaken notion that it originated in the walls of the heart. As a matter of fact very few of the fibers arise in the heart. It is a special case of universal sensory innervation of blood vessels and it can be shown that reflexes similar to that manifested by the depressor nerve can be obtained from more peripheral vessels.

In stimulating the depressor nerve (Fig. 63) marked fall in blood pressure may be noted. This fall in blood pressure occurs even after both vagi are sectioned. It is a peculiarity of the

effect that it does not appear to be susceptible to fatigue. The depressor nerve can be stimulated over a period of many minutes with nonpolarizable electrodes and as long as the nerve is stimulated the blood pressure remains low. It is important that this should be so. Obviously the function of the depressor nerve is to act as a safety valve for the aortic arch to prevent in it the development of too great pressure in the event of the cardiac discharge being unusually large. Such function might have to be exercised for a long period of time.



FIG. 65.—Effect of stimulation of the cardiac depressor nerve on the blood pressure of a rabbit. Both vagus nerves were cut in the neck previous to the stimulation.

We thus have examples of two nerves coursing upward to the medulla. One nerve the afferent vagus on stimulation is followed by a rise in blood pressure the other nerve the depressor is followed by a fall in blood pressure. That the cervical sympathetic and depressor nerves are coursing upward to the head almost exclusively can be readily shown by cutting them and stimulating each end. An effect is obtained only on stimulating the portion going to the head.

It is of interest to see if the depressor nerve is exerting tonic inhibitory impulses on the vasomotor center.

If this were a fresh rabbit and had not been subjected to an hour's etherization it might be demonstrated that cutting the depressor nerve is followed by a rise in blood pressure. This is easier to demonstrate if the blood pressure is first raised by a transfusion. In fact one theory for essential hypertension in the literature today is that it is due to disease of those nerves that begin in the walls of blood vessel and course upward to the



FIG. 66.—The effect of cutting the depressor nerve on the blood pressure of a rabbit. The recording shows a sharp rise in blood pressure (A) immediately after the operation (B). The recording is a kymograph of the blood pressure in the carotid artery of a rabbit. The recording is a kymograph of the blood pressure in the carotid artery of a rabbit. The recording is a kymograph of the blood pressure in the carotid artery of a rabbit.

vasomotor center in the medulla. The depressor nerve is the best known example of such a structure. Recently Hering described a branch of the glossopharyngeal nerve which begins in the carotid sinus. As many be remembered the carotid sinus is the bulbous expansion of the common carotid artery just before its division into the internal and external carotid arteries.

From an embryologic point of view it is logical to expect

that those structures having a similar origin should have a similar innervation\* and this is the reason no doubt why the carotid sinus is as thoroughly protected from overdistention as is the aortic arch. When the carotid sinus is distended by any of several means the blood pressure promptly falls, and conversely when the carotid sinus is emptied by ligation of the common carotid artery the blood pressure promptly rises (Figs 66 and 67). Similarly the blood pressure rises when the carotid

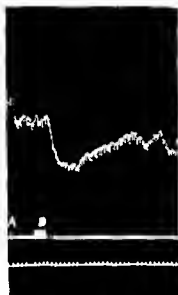


FIG. 67.—In the experiment the right carotid sinus of a rabbit was stimulated electrically at *A* and *B*. The stimulus at *A* had no effect, but at *B* a marked fall in blood pressure was noted. The vagus depressor nerves on each side have been sectioned.

sinus on each side is denervated by stripping the adventitia thoroughly of its nerves. When this is done aseptically in rabbits and when also the depressor nerves are severed a type of chronic hypertension develops accompanied by cardiac hypertrophy and

The aortic arch on the left side and the innominate and proximal part of the subclavian on the right are derived from the fourth aortic arch embryologically. The ventral stem between the third and fourth arches forms the common carotid artery, and those between the third and fifth form the external carotid artery. The internal carotid artery is formed by the third arch and the distal stems between the third and first arches.

arteriosclerosis (Nordmann). It may be that the clinical condition of essential hypertension is in some cases the result of neuritis involving those nerves that course from the arteries to the vasomotor center and the function of which is by suitable depressor reflexes to prevent overdilatation of the arterial lumen from too high a blood pressure.

It should be stated that in the majority of animals perhaps including man the depressor nerve is not a separate structure but is bound up in the sheath of the vagus. It is fortunate for physiologic reasons that the nerve is separate in the rabbit for otherwise it would have been difficult to analyze its functions with assurance. In a dog stimulation of the cephalic end of the cut vagus usually provokes a rise in blood pressure but by varying the strength of the stimulus results are obtained that are quite comparable to those that occur after stimulation of the depressor nerve in the rabbit.

## KERATOMA A LESION OFTEN MISTAKEN FOR SEBACEOUS CYST

ALBERT C. BRODERS AND ELIZABETH WILSON

THE pathologic entity which usually passes under the terms wen and sebaceous cyst is not usually a sebaceous cyst but a keratoma. In the usual text book descriptions of wens and sebaceous cysts it is stated that they are retention cysts



FIG. 68.—Keratoma showing lamellated arrangement of keratin and worm-eaten effect from degeneration

of the sebaceous glands formed by blocking of the ducts. They are lined by squamous epithelium and are said to contain sebaceous material—a soft grumous substance containing fatty granules and cholesterol crystals. When a true sebaceous cyst is opened there emanates from it an odor not unlike that given off by limburger cheese.

However the keratoma presents a different picture. Unless it is infected or badly degenerated it is practically odorless. Keratoma, especially that of the scalp commonly called a wen on cross section presents a lamellated effect (Fig. 68). As a result of partial disintegration it often has a worm-eaten appearance. We believe that the content of a keratoma is keratin

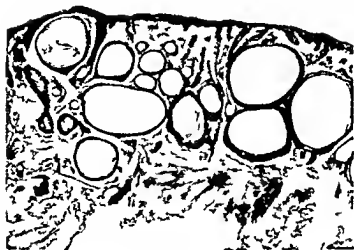


Fig. 69—Metaplastic tissue (H. E. stain) (X 25)



Fig. 70—Metaplastic tissue (H. E. stain) (X 100)

for the following reasons (1) When a piece of keratoma is burned it gives off an odor like that of burning hair wool or feathers (2) this substance does not rise to the surface of water as fatty substances do for example the contents of dermoid cysts true sebaceous cysts or of adenomas of the sebaceous glands furthermore it is not greasy to the touch and is easily washed from the fingers with cold water (3) the microscopic appearance of keratomas is duplicated in the epithelial pearls of squamous cell epitheliomas whereas metastasis in lymph nodes from a low grade squamous cell epithelioma often bear a close macroscopic resemblance to degenerated keratoma that is the lesion has a worn eaten appearance and (4) any fatty granules and cholesterol crystals present in keratomas are probably the result of degeneration Cholesterol crystals are frequently found in keratinized crypts of tonsils far removed from any sebaceous gland

Microscopically the keratoma is made up of keratin throughout except on the periphery where the partially differentiated and undifferentiated epithelial cells are found (Fig 69 and 70) The lamellated arrangement of the keratin is sometimes preserved but frequently the central part falls out giving the appearance of a cyst

### SUGGESTED ETIOLOGY

As far as we were able to determine a keratoma has its origin in the duct of a sebaceous gland This suggestion is supported by several observations

1 The normal sebaceous gland has two types of epithelium The cells of the gland proper normally become filled with fat droplets then *disintegrate forming an oily substance sebum* In the ducts on the other hand there is stratified squamous epithelium which differentiate into keratin From their structure therefore it would seem more reasonable that keratomas should be derived from the ducts

2 If skin from the face is examined plug will frequently be found in the ducts with a structure resembling keratoma even though the duct is partly open at the top



3 The sebaceous glands so obstructed and the fact that sebaceous gland in the region of keratomas show little change suggest that the glands do not continue to secrete in the face of such obstruction.

4 The more common occurrence of these tumors in older persons when the sebaceous gland are less active and keratinization increased would suggest that they occur more readily when the ducts are not flushed out by the products of the sebaceous glands thereby favoring the accumulation in them of more keratin.

5 When such tumors become malignant they are squamous cell epitheliomas and not adenocarcinomas.

Keratomas may occur singly or in groups. Many individuals show a predisposition to the development of keratoma. The keratomas vary from microscopic size to 17 cm. in diameter. The small white spots seen on the faces of many persons show an identical structure but rarely reach large size. In younger persons the regenerative epithelium of larger keratomas sometimes appears more active than usual.

#### SUMMARY AND CONCLUSION

True sebaceous cysts contain a fatty material which give off a strong odor. Keratomas on the contrary unless infected or badly degenerated are practically odorless. Many lesions diagnosed sebaceous cysts or wen clinically when examined microscopically are found to be made up for the most part of keratin and not sebaceous material. There is considerable evidence to support the belief that these lesions are tumors that arise in the ducts of the sebaceous gland rather than from the sebaceous gland proper. For such tumors we believe that keratoma is a more accurate term than sebaceous cyst.



distressing backache and unilateral pruns in the leg will be greatly ameliorated and may cease entirely following the initial applications. This immediate effect is gratifying and stimulating in that the patient responds with willing cooperation. When the factors of treatment are correct and the interval between applications is properly timed it will not be necessary to encourage the patient to continue with the course. As a rule when the general response is satisfactory the local response is also gratifying. The latter can be estimated to the fullest degree by inspection of the field of treatment. This is best accomplished with the patient in the knee chest position and with the use of the Sims speculum and some type of direct light. The knee chest position also is excellent in placing both the radium applicator and the gauze packing in the vaginal cavity. The medullary bulky cervical carcinomas gradually diminish in size, lose the typical gross appearance of a malignant lesion and ulceration and necrosis are not noted as effects of treatment. When these pernicious features are found before treatment is applied as a result of the destructive processes of the disease they should heal gradually and pass away with the concomitant disappearance of the odorous sanguineous vaginal discharge. The bulky fixed infiltrations which occur in the primary site in the vaginal walls and in the regions of the broad ligaments will diminish in size. However their response is slower and more complete following the usual interval of three months which is allowed at the end of the course.

The patients are hospitalized for a twenty four hour period before the radium is applied. Surgical technic is used in placing the radium. The field of treatment is prepared with a warm water douche before the patient is brought to the operating room. With the patient in the knee chest position the vaginal cavity is further cleansed with gauze sponges. An aqueous solution of mercurochrome 2 per cent is liberally applied to the malignant area and to the adjacent wall of the vagina. However in the case of much necrosis and ulceration alcohol (50 per cent) is applied preceding the solution of mercurochrome.

Every care is taken to avoid unnecessary trauma to the

region of cervical infiltration therefore the mechanical manipulation necessary to prepare the field and to place the applicators is delicately carried out

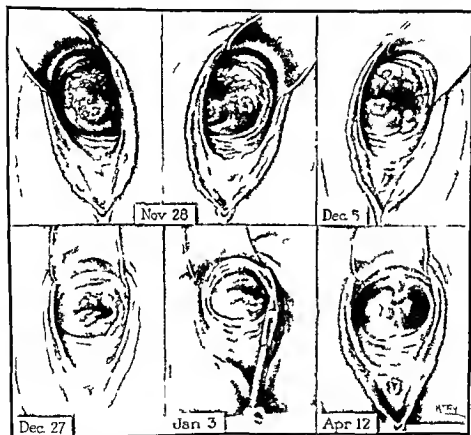


FIG 71 (Case I) —Radium was applied first November 28 and last January 3. The ulceration and decay present when the patient was first seen gradually disappeared during the course of treatment. The lesion he led as shown in the drawing (April 12) with only slight contraction of the vaginal walls. The size of the vaginal cavity approached normal. The uterus was small in normal position and freely movable.

The classification of the cases and the method of designating the technic of radium treatment to be employed are similar to those reported elsewhere.<sup>1</sup> The reports of cases and comments

Bo g II II a d Frck R F Radium in the treatment of carcinoma of the cervix uteri during 1927, Am Jour Roentgenol and Radium Therap 1929 vii 529-537

are necessarily brief. The sketches were made at the time of application of radium and at interval of five to seven days during the course of treatment. Sketches were made also at the end of the usual interval of three months following the last application of radium.

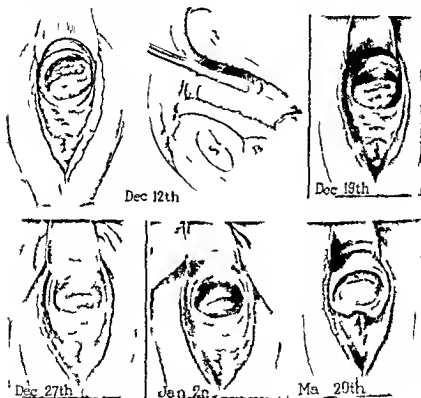


FIG 72 (C II)—Tl fit ppl t (rd mad D embe l  
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It is impossible to expose the lesion adequately in one field so liberties have been taken in making the drawing (Figs 71, 72 and 73). Two methods were employed. In one instance the retractor is shown in the drawing however the amount of

retraction is exaggerated to help illustrate the extent and situation of the primary lesion whereas in other cases the line drawing

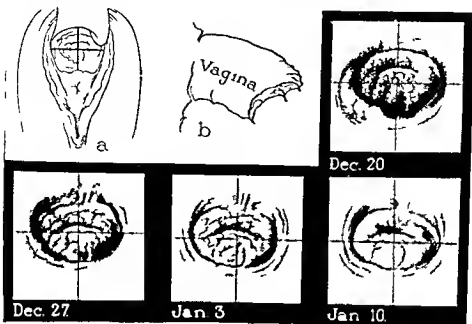


FIG. 13 (Case III)—Sketchs *a* *b* and December 20 were made the day of the first application of radium the other three sketches were made December 27, January 3 and January 10 respectively. The gross malignant appearance gradually faded away without any sign of further necrosis or sloughing a highly desirable feature of the method of application of radium in individual broken dose.

ings furnish the relationships and cross bars are used to assist in evaluating the enlargement of the field of treatment.

### REPORT OF CASES

Case I—The condition of a woman aged thirty-nine years had been diagnosed clinically as inoperable carcinoma of the cervix uteri. The pathologic diagnosis made from a bit of tissue removed was of squamous cell epithelioma grade 2. The patient stated that she had had menorrhagia since a miscarriage a year before. There had been a profuse watery yellow discharge for the last three or four months. Recently she had had several severe gnil hemorrhages and of late she had been having pain low in the abdomen. Her general health as good as before since secondary anemia. Bimanual pelvic examination revealed a large infiltrating cervical tumor extending in only a small part of the pelvic structure thus the vaginal cavity was nearly filled. Typical fixation of the broad ligament could

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This case is reported as an example of a typical inoperable carcinoma of the cervix with an extensive ulcerating lesion and marked secondary anemia due to hemorrhage. The course of treatment with radium was necessarily lengthened and the total dose was greater than the average. The patient's convalescence was uneventful. The initial response and the result noted at the end of the interval usually allowed were exceptionally satisfactory.

Case II—Th f w na g d f ty y l d be d g sed  
 ope abl m f th r v t S g l l p y a d d  
 the p thol g t p t d q n l l p th l ma g d d Th p t t

had noticed bleeding after coitus for the last two years. There had been occasional intermenstrual spotting. Vaginal bleeding had occurred with training at stool for the last several months. There was no pain. Her general health was good. Bimanual pelvic examination disclosed medullary cervical infiltration with regional involvement of the wall of the vagina. There were also multiple small areas of induration throughout the wall of the vagina. The tissue about the external urinary meatus were thickened and distorted. The fundus was normal in size anterior position and movable. Rectal palpation revealed a cervical tumor in the median line about 6 cm in diameter infiltration of the broad ligament was not found. There were rather definitely enlarged inguinal lymph nodes on both sides. A complete radium treatment totalling 5508 milligram hours and millurie hours was begun December 1. Ten treatments were given at intervals varying from two to seven days. The monel tube applicator used in Case I was placed in the anterior cervical region on two occasions for a period of eight hours each. The same applicator was placed in the middle cervical region on two occasions for the same period of time. One tandem intrauterine applicator containing 126 millcurie of radon was placed deep in the uterine cavity for treatment eight hours in duration. Filtration via a through 0.5 mm of lead and 1 mm of brass. The vaginal applicator used in Case I was placed across the region of the vaginal culdesac and in the longitudinal axis of the vagina in the deep middle and anterior thirds of the vaginal cavity. The vaginal applicators were in place for fourteen hours each with the exception of the anterior one which was in position for twelve hours. The last treatment consisted of the placing of ten platinum radium needles containing 1 mg of radium sulphate (lenient) in the region of infiltration near the vaginal outlet and external urinary orifice. The time of application was two to four hours.

The treatment of radium was followed by a course of high voltage roentgen ray treatment employing the same factors as those mentioned in the report of Case I.

At a date in March a second course of high voltage roentgen ray treatment was given employing the same factors as those previously mentioned except that each field was repeated for one hour and ten minutes.

The extent of involvement by the primary growth was not great and therefore the time of treatment was reduced. With the patient in the knee chest position multiple regions of metastasis throughout the walls of the vagina were readily seen. They proved to be numerous and accordingly palliation only was expected. The widespread involvement proved to be sensitive to the therapeutic rays of radium and the initial response as well as the improvement noted at the visit the following March was satisfactory. At that time there was no gross evidence of malignant disease. The mucous membrane of the



t be d t i n l Th t a l n f i t t l t e s e e l m b l  
 Mod r t b l e e i n g l m u c h l w p s e t  
 A m p l t t a t m t w t h l m w b e g u N l e s t t l o l  
 8 4 4 0 m l l g m h l m l l u h w g l n p p l e t  
 Th t r a l l t e t a t m t f f m t h t s e d y A l l p  
 p l t p t t h t a t t t m t w m d w t h t u s a l  
 m e l t b e p p l c a t n t g 5 9 m g f a d m l p l t ( l m t ) t h e  
 w l l f t h t b e l m e l m e t l r 1 5 m t h c k l u t t n t  
 g n w t h t h c r c a l f i l t t b o t t h e n t l p o t d h  
 p p l t m a d p o t f f t h Th s a m t b e w a  
 p l l t h t e d m d l p e t s f t h c t r p s e t t l g  
 f r v l f i l t t The t m o f h p p l c a t w f o t e e h  
 T m l l l t n g 5 m g f f m l p h a t e ( l m n t ) w  
 b d t h n f i l t d b o t l t 2 m p a r t Th t m f t m t  
 t w l h u A t d p p l e t c t g 1 1 0 m l l e t s f f  
 w t h p f o r f i l t t t h g h 0 5 m m f l d l m l b a  
 w t d d n t t h t A t y a l l w e d t r m p l f r  
 f t e h Th l a g l p p l t w p l e d t h g l  
 l d s a d t h g h t d l l e v a g l f t p e f f f r t  
 h h l c S e p t e p l t w m l h g m  
 t d  
 Th e o f d m t r t m e t w f l l t y t h l p l t f  
 h g h o l t a g t g y Th f l l g f t w p l l k l l t  
 2 0 0 m l l m p e 5 d t 5 0 c f l t r t t h u g h c o p p e 0 5 m  
 l m m 2 m t m l f t h l o t h f l a  
 t p t l t w l t r l f l l O e e a c h l a y w a t t l t l v  
 l l l l b e p w e l  
 Th p t t t d t h f l l w g A p l d t t h a t t t h f i l d f  
 t t n t f f g t c m t f i l t t l l g l a  
 h l t h w a g o d M p l m p l t w e m d a t l y d t g Th  
 l s e d f h g l l t g t b r y t m t g w t h  
 t h m p l y m t f t h s a f t t l s e n t l

This case is reported as an example of a typical inoperable carcinoma of the cervix with an extensive ulcerating lesion and marked secondary anemia due to hemorrhage. The course of treatment with radium was necessarily lengthened and the total dose was greater than the average. The procedure was uneventful. The initial response and the end of the interval usually allowed satisfactory

Case II—Tl ca f w m g l f t y y l  
 p e b l m f t h r v t S g e l b p  
 t h p a t h l g s t p o t d q m l l e p t h l m a g d d

risk is assumed. When the cervical canal is eccentric it may be necessary to place the needles to obtain a uniform response. They are also used effectively in the treatment of the metastatic infiltration in the walls of the vagina that is found in some cases. Metastasis to the left supradavicular lymph nodes has been observed in an occasional case and this complication may prove troublesome.

Finally the cases reported here were not selected on account of what may be considered an unusually good response to treatment. Instead they must be considered as cases which have responded satisfactorily to treatment and as representing the average result obtained by the intensive method of treating cases of carcinoma of the cervix uteri with broken doses of radium and roentgen rays.



## UNUSUAL TUMORS OF THE SPINAL CORD

WINCHELL MCK. CRAIG

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Case I—A man aged fifty nine years came to the clinic January 1, 1929 because of pain in the lumbar portion of the spinal column and of weakness and numbness of the left leg. In October 1928 five months before admission the patient first noted an area of excessive cold perspiration above the left knee. This sweating occurred at intervals of a few days lasting two or three days for about a month. The area was 10 cm in diameter just above the knee entirely and would cause a wet spot to appear on his trouser leg. One month after the onset of this perspiration the patient was conscious of tingling and increasing numbness in the left leg first from the knee down to the ankle and later extending into the thigh. Some infected teeth were removed in November 1928 in the hope of improvement but the condition steadily grew worse. About two and a half months after the onset lancinating severe pain appeared in the lumbar region at night and the patient was obliged to get up and sit in a chair. The pain extended from the back in the lumbar region to both inguinal regions including the iliac crest. The pain was also brought on and increased by jarring or moving. Depression of the trachea would cause an increase in pain coughing and sneezing also gave an exacerbation of pain. Four months after the onset of symptoms ataxia of the left leg developed which was followed by definite weakness in the leg. About the same time numbness at the bottom of the right foot developed. During the month previous to admission the bowels which were ordinarily regular became very sluggish necessitating a regular cathartic.

The patient was of medium size and well developed. The systolic blood pressure was 158 and the diastolic pressure 90 measured in millimeters of mercury. The pulse rate was 72 and the temperature was normal. An abdominal scar from cholecystectomy which had been performed in 1927 was noted. Both feet showed marked clubbing the hallux more than the second toe. There was congestive failure. Urinalysis was negative. The hemoglobin was 13 per cent the erythrocyte number 4,640,000 and the leukocytes 4,600. The Wassermann reaction of the blood was negative. Vision in both eyes was 6/7. Pupils fields and fundi were normal. A roentgenogram of the thorax was negative but a roentgenogram of the lower lumbar and sacral regions showed marked hypertrophic arthritis of the lumbar portion of the spinal column. Neurologic examination showed reduction in speed of tendon reflexes and slight hyperactivity on the left. There was a slight clonus on the left adductor in the internal and external hamstring reflex.

fl e both cr m t fl wa bse t th left Th w m k d  
 p t c t y f t l l f t i g d l i g h t t A d f i t e s e s o r y l l c o l d  
 b e a s e t a d t b o t t h f i t l m b s e g m t b e l w w h i c h t h a  
 l s f p a n i t m p e a t (g a d d 2 t 3) Th e w l s o l s s f j t  
 s e s e b o t h g t t S p a l p a t e w d e d t h c b p l  
 fl l w n g a t e t t h k o l m t t t t l p r t f 50 m g f o a h 100 c.  
 g a t g l l l t t 3 m l l y m p h o c y t n m a l c o l p r f 17/6 d  
 d l y l p o s e t j g u l p e w p e s e t A d g n w m d f  
 t f t h p l c o d d e p l a t o n a t t h f i t l m b a s e g m t w  
 a d s e d

Ope t wa p e f m d J a r y 26 1929 a t w h i c h t m t h p e s  
 d l f m t h t t h l e t h d t l f t h t h c v e r t b w

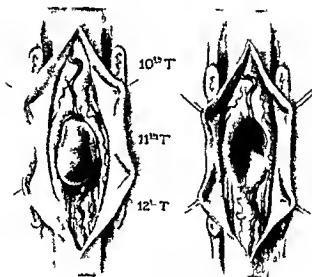


FIG 74—N fib mb did th p l d m p l t l y m r e d

m d Th w p l s a t i f t h d d t h t l d b e p l  
 p t d p p o t t h l t h r t b Th d a w p e l d t m  
 f d l y g n b d d t h d d l g t h p o t r l m  
 t h g w t h d t h p p e f k t t t t h t h p p e p r t  
 w t g u w t h t f t h c o d w h t h e l w d w l  
 t d d l d l p t d f m t h e d Th t m w d t l y a t  
 t h l t l t l r v t b t s o f i m l y m b e d d t h c o d t h t  
 t g o l d t b d t m d A t w t d t h l p o l  
 d t h t m w l t d A f t t h p l h d b e d p e m  
 w s e t t t h l b t r y f m s c p t f f t  
 f f r h t Th p t h l g t p r t d t h t s s t b e n f i b m a t  
 p p n Th t w t h g t l y d t d f f m t h d  
 A f t m a l t h e m d a m k d d p t h d h h

tended almost to the central canal but the cord did not seem to be injured (Fig 74) Hemorrhage was controlled by pledgets of muscle

Convalescence was uninterrupted and the operative wound healed by primary intention When the patient was examined eighteen days after the operation he seemed to be much improved and was very happy over the result of the operation He had not had any pain and the anesthesia and paresis had disappeared He had regained strength and the incoordination was markedly improved The sphincters had regained normal tonus At the time of dismissal the patient's condition was still more improved and subsequent letters report continued recovery

Lesions of the spinal cord are so protean in their manifestation and the underlying pathologic changes are so varied that every case demands individual attention The foregoing case did not present clear cut diagnostic signs and yet certain symptoms designated the presence of a tumor of the spinal cord The history of pain becoming worse at night and the partial subarachnoid block together with the neurologic manifestations substantiated such a preoperative diagnosis

Tumors growing from and involving the spinal cord always carry a much more discouraging prognosis because they usually prove to be of the glioma group microscopically and either can not be removed or tend to recur whereas neurofibromas are enucleable and do not recur

The subsequent convalescence and recovery of this patient substantiated the operative diagnosis of the lesion and further demonstrated the necessity of good pathologic facilities in dealing with unusual and difficult lesions at the operating table

Case II—A woman aged fifty years came to the clinic April 11 1929 complaining of difficulty in walking and numbness in the legs and about the abdomen About six months before operation the patient noticed that she was stumbling at times when walking due to clumsiness in the right leg The right foot seemed to drag and to catch on the rugs and other obstacles Shortly after this she noticed numbness in the soles of both feet most marked in the right She had a sensation as if the right leg on pad and gradually the numbness increased and ascended until it involved the entire right leg Immediately after this the left foot and leg began to be numb and this numbness extended up over the abdomen to the costovertebral junction Later she noticed a grilling sensation about the abdomen as though a tight rubber band had been stretched completely around her Since the onset of trouble November the left leg had gradually become weaker and more difficult to handle until at the time of examination it was practically useless

l-s Also d had l el ped l a ty f th f both l  
 t mte At fi t h w k l w th f ly w l l i t d i g th k  
 pec l g g t t h l d h l l f lty n w l k g w th  
 t ce Sh wa n l l t f l th po t fl l g n b e d a d h h d  
 t ced a f w d y b e f g t th el that he w a w a l th  
 we g l t h l e h l l h e y u g l g l t n h k F th p  
 t th e e y h h l m pl l f w e k b a c k t t a d f d l l  
 ch g p a b e t w th h l l b l d

Th p t t w f m l u m h g l t d w g h e d l 4 p o d Th blood  
 p w 92 y t l e l 65 d t l w th p l s e t o f 72 l n o m l  
 t m p e t u U n h y w g a t Th l m g l b w 68 p e c e t  
 th r y th y t u m b e l 4 0 0 0 0 0 0 d t h e l l o c y t 5 2 0 0 Th W  
 s e m t f th b l o o l w g t The l l o o l g o p g w a l l  
 A o e n t g g m f th th w g a t e b u t e f t h e t b  
 h w d l i g h t h y p e t p h th t The w l i g h t k y p h th m d  
 d s a l g w h e l w p o t l a n l o f o g f i c a N e u l g  
 m u t l e d w k f th s e l e s n b o t h l t m t m o  
 m a k d o t h g h t T l p t l l f l w l i g h t l y c e s e l o t h l f t  
 d t h h l l e f f w d s e l g r d d 2 t 3 th g h t Th  
 t l l t r a l h m t g f l e w c s e l g d l l t o 2 th  
 l f t Th p g t l d l h y p o g t f l w b o l h d  
 b o t h l w b o t h l f l l t e B b k a d C h d d k  
 g n w p e t th g l t l Th w l s s f j t s e s e b o t h  
 g t t o t h d n u t f l t (g l l 3) b o t l k e e A c u t y f  
 t h t m p t d p a b e l w t l l l o f t h t h r d l s a l g m t w  
 l s e d b t t a b o l h d E x a m t f t h c b p l f l l d  
 g t k l m t d 6 0 m g t t l p t w th p o t e g l b l  
 t Th w l m l l y m p h o c y t d l l g l y m p h o c y t h e u b  
 m l l e t Th l w l l b i t l m p f t h j g u l  
 e th w l t e f t h f l d t l m m t o p o t  
 Q k s t d e g A d g a m a d f t u m f t h p a l c o d l  
 p l t w l l p p o t t h t h d t h a c g t  
 A p l 8 1 9 2 9 l e c t y t g f t h m l f t h p l  
 l m f m t h f t s e d d t h l t h r a t b r a w a p e r f r m d  
 Th w a p l t f t h l h t w p o s e d l m c o l d b e  
 p l p t d p p t h n i t l e t b t l t h l O g  
 t h d t m l d l s e l y g t h g h t t l t l p e c t f  
 t h d m p g t t b o t h l f t m a l A l t h g h t h l o h d  
 t h g h t t l a h d f i b b l t m d l n d t h l m a  
 t w t d t t h u l l y t l Th p p p l w a  
 f l l y l e t d d t h t m w f d t p o d g l y d f f s e  
 b s e W h t l t m w m p l t d t h c p l w b r o k d m a l l  
 p e m n f t w s e t t t h l b t r y f r f s e t n d m  
 c p e x m t T l p t h l g t p o t d t h t t o t o f l l  
 d f f e t a t d l d f i b b l t n C q t l y t h t m c a  
 l l y t l d d w m p l t l y m d b y s e t o f t h d r a l t  
 t h m n t (F g 7 5) A f t t h t l d b e d t h c o l d b d m  
 t t e d t h l g b w l h l l l m t h l f f t l l d h h

grossly resembled the endothelioma en plaque within the cranial cavity which Cushing has described.

Convalescence was uneventful and the wound healed by primary intention. When the patient was examined April 30 twenty-two days after operation there was marked improvement in sensation and slowly returning power in both lower extremities. A letter from her in November eight months after the operation stated that she was walking and doing her own

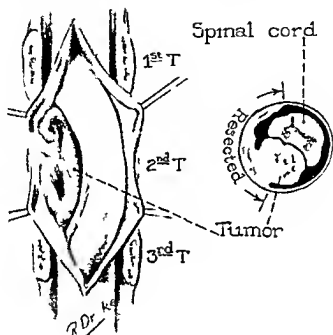


FIG 75 — A hand fibroblastoma with exceptionally large dorsal attachment

house work and that the edema and vasculature of both legs which had been present previous to operation had completely disappeared.

### COMMENT

Both of these cases are of interest because the majority of all the tumors of the spinal cord which are operated on and found to be removable are classified as either arachnoid fibroblastoma or neurofibroma. These two cases demonstrate the necessity of a knowledge of the lesion at the time of operation. In the first case the tumor had the appearance of a glomatous lesion situated in the spinal cord itself but by dissection of the caudal portion and removal of a specimen for



microscopic diagnosis the type of lesion was determined and the entire tumor was removed. Also in the second case during operation a discrete tumor was exposed but although the tumor could have been removed without its base it was of paramount importance to know the microscopic appearance of the tumor and to remove the entire base regardless of the area of the dura involved because if a portion of the base had been allowed to remain recurrence would have been possible.

These two cases are presented not only because of the somewhat vague symptoms that were manifested but because of the unusual character of the lesion. In the majority of cases the gross appearance of tumor of the spinal cord is sufficient for a differential diagnosis but whenever the gross appearance is misleading then the microscopic examination of fresh tissue proves of invaluable assistance. The ultimate result in both of the cases depended on the surgical removal of all tumor tissue. Knowledge of the type of growth led to greater precision in operating and more concise comprehension in prognosis.

# PERFORATION OF THE DUODENUM CHRONIC INTERSTITIAL CYSTITIS AND CHRONIC GRANULAR URETHRITIS SUBACUTE APPENDICITIS AND HYPERTHYROIDISM

CLAUDE F. DIXON

## PERFORATION OF THE DUODENUM

Case I—A man aged fifty two years came to the clinic October 30 1929 complaining of paroxysmal attacks of sharp pain and burning in the epigastrium. During the last two weeks there had been relief from food particularly milk. There was also occasionally some relief from sodium bicarbonate. Since the onset of symptoms the patient had vomited a few times each time preceded by a sensation of fullness in the epigastrium. The vomitus did not contain blood. There was no history of tarry stool.

The patient was rather anemic and undernourished. His weight was 10 pounds below normal. Urinaly was negative. The hemoglobin was 83 per cent the erythrocytes numbered 4,400,000 and the leukocyte 5,600. The test meal showed a total acidity of 80 and free hydrochloric acid of 68. There was slight gastric retention. Roentgenogram of the stomach showed an obstructive lesion of the duodenum. A study of the blood showed urea 22 mg. chlorides 561 mg. for each 100 cc. and the carbon dioxide combining power of the plasma 64 volumes per cent. During the night following the second day of examination the patient was seized with a severe sharp agonizing pain in the epigastrium. An opiate was necessary for relief. There was marked tenderness and slight rigidity in the upper right abdominal quadrant. The remainder of the abdomen was neither tender nor rigid. A diagnosis of perforating duodenal ulcer was made and the patient was hospitalized. For three days he was kept quiet in bed with packs of ice over the painful area. Only small amounts of water were given by mouth. A solution consisting of sodium chloride 1 per cent and glucose 10 per cent was given intravenously in 1000 cc. quantities twice daily. On the fourth day after the patient's admission to the hospital exploration was carried out through a proper right rectus incision. The peritoneum was flamed. The duodenum was partially plastered to the undersurface of the liver. There was a small amount of thin yellowish bile stained fluid free in the abdominal cavity. Careful exploration of the duodenum showed a perforation about 2 cm. in diameter about 3 cm. below the pyloric sphincter. Because of the friability of the duodenal tissue a satisfactory closure could not be made. Three or four interrupted sutures of silk were used in attempting the closure. Over this area the gastroduodenal and the greater omentum

w e t d Th t m l w m k dly d l ted It d d t se m se t  
 pe f rm g t t t my be se f th p co d t f th p t t  
 l bec f th b t t f th d d m th f j j t my f th  
 W t l typ w pe f m d th th se f mb 18 F h th t  
 Th t b w b ght th gh tl m t m d th t f th bd m  
 th gl t b d Tl p m ry w d w l se l w th t d g  
 F d g th gh th j ju t my t be w b gu mm d t l N th g  
 ll w l ly m th f t d y wh mall m t f l q l  
 g Oc o l g t c p t w tl mall l d l t be l d  
 f m 600 t 1000 c t t ch tw ty f h f t d y  
 ft wh h t m l q d t k th ut d t t t Th j  
 j t my t be w k pt f tw t se d y By th t l q d d  
 ft f l w l y t k lly d th t be w m d f m th j  
 j m Th mall w d h l d f d y Th p t tw d m sed  
 f m th h p t l th th ty se tl po t pe t d y t wh h t m h  
 w bl t t k lght f d w th t d se mf t H g l d t  
 g d

In this case apparently there were no symptoms until perforation occurred. Occasionally one sees an acute perforated duodenal ulcer without any previous history suggestive of such a lesion. Just how long complete perforation had been present in this case is questionable. The history is at least presumptive evidence that it had been present several days and possibly longer. The jejunostomy opening furnished a means of feeding and it was made much more rapidly than gastroenterostomy could have been performed. Moreover the stomach was put at absolute rest. Should further trouble arise gastroenterostomy could be performed and in all probability the condition of the patient would be much better than it was at the time of the first operation.

#### CHRONIC INTERSTITIAL CYSTITIS AND CHRONIC GRANULAR URETHRITIS

C II—A w na g d f ty th y m t th l Sept mb  
 21 1929 mpl g f l f qu y d t f fift y  
 d t Th w h t y f h m t O lly t l f tw  
 th m th b d l p d wh th p t tw pa t ly f f  
 ympt m pt f q Th dy w ld le lghtly l d t t m  
 by t k g l g m t f d m b b t Ad g f H  
 l h d b m d l wh F lgu t h d g v lght l f t l  
 d g th l t ht m th wh p t h d b t l t Th p

patient's general physical condition was good except for marked nervousness and a loss of 15 pounds in weight.

Examination was essentially negative except for the urinalysis which showed pus cells graded 2. Roentgenograms of the kidneys, ureters and bladder were negative. The tests of renal function gave a normal response. Cystoscopic examination showed a small bladder of 100 c.c. capacity, chronic interstitial cystitis, graded 3, involving most of the wall of the bladder and chronic granular urethritis. The irritability of the bladder was extreme. Specimens of urine from both kidneys gave a negative result on culture and guinea pig inoculation. Because of the long duration and severity of symptoms and because the condition was not amenable to treatment, the ureters were transplanted into the sigmoid. The operation was done in two stages. At the first stage the right ureter was isolated and cut off close to the bladder and transplanted into the sigmoid. Ten days later the left ureter was likewise transplanted. The convalescence was without incident.

Three months have elapsed since the second operation. The patient has remained entirely free of symptoms, has gained 20 pounds in weight and has resumed her usual household duties.

Ureteral transplantation into the sigmoid has heretofore been done mainly in cases of exstrophy of the bladder occasionally for carcinoma of the bladder and rarely because of vesicovaginal fistula. The technic of this procedure has been perfected so that the operation can be done with comparatively low risk. It would seem that in some far advanced cases of Hunner's ulcer such as the one presented here ureteral transplantation into the sigmoid may be one way of affording the patient a comfortable existence.

## SUBACUTE APPENDICITIS AND HYPERTHYROIDISM

Case III—A woman aged twenty-three years came to the clinic May 13, 1929, complaining of attacks of sharp pain in the right lower quadrant of the abdomen of six months' duration. During the last two or three weeks the pain had been constant, but acute exacerbations. There had been no nausea or vomiting.

Examination disclosed slight rigidity and tenderness in the right lower quadrant of the abdomen. The leukocyte numbered 9,600. Urinalysis negative. Roentgenogram of the thorax negative. It was the consensus of opinion that the patient exaggerated her symptoms somewhat. Because of this and the inability to rule out acute pelvic infection, she was hospitalized. Two days later she again experienced the severe pain. There was no radiation. The leukocytes numbered 17,200. There was marked tenderness and definite rigidity over the region of the appendix. Examination of the pelvis was negative. There was no vaginal discharge. Operation was advised.

Th gh mall l w ght ect c o a ubarut ly fl m d ppe d  
w m ed E pl t f M k l d tcul m w g t Th  
pel o ga w mal  
The mmed t pot pe t e co l sc w w th t cide t O  
th th d d y th t mpe t wh h h d t be hgh th 99 to 100  
F se t 104 2 F Th p lse wh h h d be d 80 becam el ted  
t 160 m t P t t d pot pe t e h m h g w co d d  
E cept f the l at f t mpe t d p d p lse th w gn  
po t g t th f th se d gnose Th re wa sea vmt g  
Exam at h w d ma k d t m wh h l d t th co d t f hype  
thy d m Th thy d gl d w ly lghtly palpabl h d bee ted  
p l m ry xam t B ca se f th t m d pla d l a  
t f p lse d t mpe t p l diag f phth lmc g t  
w mad d l g d se f compo d sol t f d w g f  
q tly W th t ty f h th p lse h d d pped t 100 m t  
d the t mpe t t 99 6 F l d w t d f se v l d y O  
th ghth po t pe t d y th b sal m t bol m w +24 pe ce t T  
d y l t pa tial thy dect m w pe f rm d A local th t w  
used Th thy d gl d w l g d t bo t tw ce th f th m l  
gl d T m t g t bo t f th fa rmal d thyr d l be  
p serv d th l Th g ppea ce f th gl d wa th t  
f phth lm g t M scop xam t h w d d ff se pa hy  
mat hypert phy w th g t e hyperpl C val see ce  
w th t d t

It seems logical to assume that this case would have eventu-  
ated into exophthalmic goiter crisis had iodine not been given.  
This case demonstrates that mild hyperthyroidism or potential  
hypothyroidism may be precipitated by some such shock as a  
surgical operation. It is possible that the acute infection in the  
appendix may have been a factor also in precipitating a definite  
hyperthyroid reaction in this case.

Hyperthyroidism is not always easily diagnosed. In surgical  
cases when postoperative complications arise one usually at-  
tempts to account for the symptoms on the basis of a direct  
complication from the surgical procedure. This case would  
suggest that hyperthyroidism may go undiagnosed in such in-  
stances unless its possibility is kept constantly in mind.

# COMPLICATIONS OF DERMOID CYSTS OF THE OVARY CHEMICAL HYSTERECTOMY

VIRGIL S. COUNSELLER

DERMOID cysts of the ovary contain some or all of the elements of the skin as well as bones, nerves and mucous membrane. They are usually unilocular and exhibit more or less perfectly layers of skin, sebaceous glands, sweat glands and hair. It is not uncommon to find teeth imbedded in the wall of the cyst.

According to Kelly, the walls are lined by many layers of squamous cell epithelium varying from a thin membrane almost transparent to one that is thick and leathery; the contents are oily, thick, greasy and sometimes cheesy due to the secretions of the sebaceous glands and fatty degeneration of the epithelial cells.

Complicating conditions are more common than in other type of ovarian cysts since attacks of localized peritonitis may occur. The two cases presented here illustrate two complicating conditions which occur with these cysts.

## INFECTED DERMOID CYST WITH FISTULA OF THE VAGINA

Case I—A woman aged forty-five years was admitted to the clinic August 19, 1917, complaining of weakness, pain in the thigh and a discharge from the vagina. She had been quite well except for the discharge previous to March of this year. In September developed the right lower quadrant of the abdomen and discomfort in the thigh. This had been followed by considerable weakness and loss of strength. The region of the coccyx. Her appetite gradually failed and she lost 30 pounds. She had become weaker progressively and in the past year prior to her admission had been unable to walk without assistance. Ten years before admission a pelvic abscess developed which was drained though the vagina. This had continued to discharge for a limited interval but eventually had not occurred in the past few years.

The stool and blood pressures were 117 and the diastolic 8. The temperature and pulse were normal. The Wassermann reaction of the blood was

gat A lyses f th u a d gat co t t w eg t Th  
 m t f th blood wa g t O m t f th pl a  
 t d m bo t 10 m n d m te ld be f l t t th r ght of th t ru  
 Tl ut ru f n m l b t l ghtly f d n th m d po t A  
 fitul t a t pe lt the ght f th rv f m h h f lp rul t m t  
 al w l sch g d O cc ut f e t m t d th g f th  
 pel c m h t dou h r adm n t d tw c d y f t w ks Fl  
 l ng th t tm t th ma dec sed c d rably d w t  
 t d n l plo at f th fist l t ct v ad sed  
 U d g e th the fit l tra t w d lat d a l pl el th  
 place t l f r ps La g m t f f l m il gh d ec t c b  
 t w m el The c v ty o plet ly t l d c t d  
 with t n t th gat d w th wat w ped ut with d g  
 d pa ked with t p f d f mg  
 Th co l sc n w t f l Tl g w gr d lly m ed  
 d ly so th t it w all t ly th f i t th po t per t d y Exam to  
 f d y l t h d that th m w alm t l t t l d the f l  
 d h g h d d H e d h s d ly f th ee w k d sed f l  
 l w g th pat t d sal f m th l p tal

## DERMOID CYST WITH TWISTED PEDICLE

Cas II—A w g d fifty ght y w d tt d t th l  
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 y h l l h l tt k f e p l th d f the pl l t g  
 ly a f w t Th u lly f ll w d by l ght l k h S  
 m th p t g t t se l t t ks f p n the l f t d f th  
 pl s ed i d t d w th ll g th sa  
 th tt k l t d d y Th f ch ll D g th  
 l t tw m th th tt k h d c d f q thly d d y bef  
 d s tt kw so t se t l t h w d tt d t th l l h  
 p t l f t tm t Th tt k a t l w th d t g  
 Sh lo t 40 po d d be p gr ly w k  
 O xam t th p t t th a l ppe d d ly l t d Th  
 t mpe t p l se a d i t w l Pl va t w  
 t n ly p f l s f l g t d m bo t the f f r  
 m th f t s wh l p l th po t of th ut ru Th l t t cold  
 t b d t d p t l Th d b th l e t d b t  
 fr fr m p l i bl ma  
 A d g o f py m t t fl mm t ry d se se f th pel s  
 m d d ho p t l t l co r t t tm t d d Sl h t  
 d h w g tw d d p ek w pl d th l r  
 p t f th bd m La g i t t f fl l r g e by uth d ly  
 t co t th d hyd at Aft t w k d c f pel fl mm t  
 h d l g ly l d l l t th m d t l m Pl l t t  
 a ad sed  
 At pe t y t bo t 10 m d t r f d It  
 wa t a d d w th m t Th gm d tt h d f m ly

to it over the left side and posteriorly by fibrous and fibrous adhesions but the cyst had not perforated into the bowel. The cyst was twisted two and a half times on its pedicle almost excluding the blood supply to the left tube and ovary. It was separated from the sigmoid bladder uterus and omentum and left salpingo oophorectomy was performed. The uterus was atrophic and was turned behind the cyst. The raw anterior surface of the uterus which was exposed where the cyst was removed was protected by suturing the round ligaments over it. The right tube and ovary were normal. The appendix was atrophic and was not removed.

The pathologist reported the mass to be a hemorrhagic dermoid cyst containing sebaceous material and hair. The patient convalesced uneventfully and was dismissed from the hospital on the fourteenth postoperative day. In a recent communication he stated that four months after the operation she is in good health.

### COMMENT

Dermoid cysts of the ovary constitute 4 to 5 per cent of all ovarian tumors. Marshall recently reported a series of 415 cases in which operation was performed at The Mayo Clinic (to November 1, 1927). The diagnosis was not made in any case before operation. Pelvic tumor was diagnosed in 37 per cent, ovarian cyst in 26 per cent, uterine fibromyoma in 15 per cent, abdominal tumor in 5 per cent, acute appendicitis in 4 per cent, pelvic inflammatory disease in 2.5 per cent, and extra uterine pregnancy in 4.1 per cent. In three cases of the series draining fistulas, two abdominal and one vaginal, occurred following operation elsewhere.

In Case I the vaginal fistula originated in an infected ovarian dermoid cyst. Such cysts may occur at any period in life but they are the most common form of ovarian tumor seen before puberty. At puberty and immediately afterward unilocular cysts chiefly parovarian are more common than dermoid cysts. Most of the reported cases occurred between the ages of twenty and forty years, a few have been found beyond this period.

The diagnosis of dermoid cyst of the ovary is rarely made before exploration since symptoms may not be present for years. This is explained by the fact that they are slow growing as compared to proliferating cysts of the ovary. There is a marked tendency for these tumors to become fixed in the pelvis by attachment to the rectum or vagina when they become secondarily infected. Pregnancy and parturition have been reported as the



most common causes of the symptoms originating in dermoid cysts either by producing torsion of the pedicle as the cyst is pushed upward by the pregnant uterus or by trauma to the tumor which is adherent in the pelvis during delivery. A diagnosis of inflammatory disease of the pelvis or abscess is frequently made as in Case II. When suppuration occurs perforation into the rectum, vagina or bladder usually takes place as in Case I. The most common site of rupture is the vagina; the next in frequency is the rectum. The resultant fistula remains for months or years unless the content of the cyst is completely evacuated.

The treatment of complications of dermoid cysts of the ovary is purely surgical. When suppuration and perforation have occurred it is far safer to dilate the fistulous tract, evacuate the cyst as thoroughly as possible and scrape the inner wall with a sharp curet so as to eradicate the epithelial lining and all dermoid structures. Free drainage must be established by thorough dilatation of the fistulous tract. If the wall of the cyst has not been punctured by the curet the cavity should be irrigated thoroughly with a warm solution of sodium chloride and packed solidly with iodoform gauze. The gauze is gradually removed and the cyst and fistulous tract will contract down to a scar provided all elements of the cyst have been thoroughly removed. It is extremely difficult and dangerous to remove a dermoid cyst by the abdominal route which has perforated externally on account of the high risk of general peritonitis, the deep situation of the tumor in the pelvis and the dense adhesions of the wall of the cyst to adjacent structure. Abdominal exploration must be performed as soon as a diagnosis has been made of cyst of the ovary with a twisted pedicle for the blood supply as a rule is practically shut off and if the cyst is a dermoid it may perforate into the peritoneal cavity and produce fatal peritonitis. However the pedicle may become twisted and the cyst remain in the pelvis where it is covered and protected by the omentum. This condition is usually diagnosed and treated as pelvic inflammatory disease or pelvic abscess. The true condition is revealed when the cyst perforates externally or is drained surgically through the culdesac.

## CHEMICAL HYSTERECTOMY

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CHEMICAL hysterectomy appears to be gaining in popularity as a surgical procedure in certain selected cases. The caustic agent zinc chloride which is used in these cases was introduced fifty years ago in the treatment of carcinoma of the cervix and uterus but only in recent years has its use been extended to selected benign conditions of these organs. Babcock advised that it be used to destroy an infected endometrium such as occurs in chronic gonorrhea and other infections of the uterus that resist milder therapeutic measures to produce absolute sterility in mental defectives and to eradicate recurring uterine polyps and submucous fibromyomas lying close to the endometrium.

Masson and Foucar in 1925 reported the use of zinc chloride in thirty cases of benign lesions of the cervix and uterus at The Mayo Clinic with very favorable results. The chief complaints in twenty six of their cases were bleeding, menorrhagia, metrorrhagia or irregular bleeding after the menopause; in the other four cases the complaint was chiefly of leukorrhea. In none of the cases did the condition seem to warrant radical surgical procedures.

The case reported here is representative of a group of cases in which chemical hysterectomy is not only advisable but perhaps is the best form of surgical treatment.

### REPORT OF CASE

A woman, age 40 years, registered at the clinic October 1929 complaining of painful defecation and excessive bleeding during the menstrual period. Nine years prior to registration she had had painful swelling of the tonsils and then nothing progressed seriously until nearly all the joints were involved. The condition had varied greatly at times she was able to do her household and at others she was unable to dress herself. The tonsils had been removed and the teeth extracted to eradicate focus of infection. Back and nagging headache without noticeable relief. Three years before admission the flow at the menstrual periods became excessive and a prolonged flow for ten days. The

iso aluk h i l s c h g h h l a i t t d i t t h m t r u l  
d t b a n S h h d b e e p g n a t t h t d h d h a d n  
c a g a d t w a l n g h l l e

O x a m t t h p t t p p e l t b e l l h d b t m  
Th j t l m u m u a l t h l t t h p e c f t h e h r t Th m t a  
p o p l k l j t f b o t h h d w t h k l a n d t h p h i g  
d f e c t l l t l l Th t o f t h j t b o t h l b o w w r t  
d a k l t t d T l r s o f t p a l l u l l c e t d d  
m t t d m p u l n d h g T l f d u f t h u t u l g h t l  
l g d d t l d x a w m a l S c e t h r h l d b e c o d d  
a p o b l f f f t f m a l o c l t d p o t l l u t a k e f m  
t T l s c u l t d l l t h h w d a t f t o c c a l f e c t t b e  
p s e t



t o—C t e n o d f f t d a y a f t p e t

B c a u s e f e l m l g d a s o t d f t e r v t m a l  
d t u d b c a u e f t h m t a l t e d h p g v e h  
m a t d r i t h t h m l h y t r e t m y d d l t p e f r m d  
O c t b 15 d k l t h s Th d i t l d t h u t r u  
w t h g h l t l d p n g d l y w t h t p o f d f m g u  
Th r g p d l n t c u l m f e p t h t l p n d  
a t h p o t l p Th t w a g w t h a e d t h a t h l y  
f p e t l t u m d t h d d t h r x v a p l a e d p l g u  
s o a k d s c l u t f s a d b e a b a t e p t t g a t c o n t t  
o f t h g f t h t h c a t h l d A t p f p l g a  
b o t 2 d t h l g n t h l g w a d p p d a s a t t e d  
s o l t l h l l l q d f l y d r y T l g a u t h c a  
f u l l y p k d t t h t d t r v n l y a m l l t p f t w l f t  
j u t d f a t h t l Th e r v x h l d h u t b y t w t l l p  
t p t a v t t h s o l t f m d p p g t t h m u n m b f

the vagina. The gauze was removed from the uterus in thirty five hours under continuous irrigations with a solution of sodium bicarbonate. Douches with the solution were given twice daily until the cast had separated and was removed which occurred on the fifteenth postoperative day without incident (Fig. 16).

### COMMENT

It has been definitely proved that the cervix is the focus of infection in many cases of rheumatism and secondary infections of the eye. Frequently a cervix which is the seat of chronic streptococcal infection is associated with polypoid endometritis and troublesome leukorrhea. This condition is most common among patients aged more than forty years; the patients occasionally are obese and have chronic disease of the heart or kidneys.

High amputation of the cervix or coning out of the gland bearing portion of the cervix may be sufficient to eradicate the infection but does not cure the menorrhagia. Total abdominal hysterectomy may be contraindicated because of complicating conditions which may arise subsequently.

Chemical hysterectomy by the use of zinc chloride as used in the clinic has proved a safe procedure and one which accomplishes the same result as total abdominal hysterectomy. It should not be substituted for total abdominal hysterectomy but used only if destruction of the endometrium and cervix is desirable.

Convalescence following chemical hysterectomy is usually uneventful. The course is usually afebrile because the zinc chloride acts rapidly on the endometrium forming a zinc albuminate in the cells. The smaller blood spaces and lymphatics are rapidly sealed by the corrosive action thus preventing any absorption into the general circulation. After about ten days the cast separates and is discharged into the vagina leaving only a thin layer of uterine muscle which soon contracts to about the size of an infantile uterus. It may be necessary to grasp the cast with forceps and rotate it in order completely to separate and extract it. However it usually is discharged spontaneously. Postoperative bleeding rarely occurs but if it does occur a light vaginal pack is sufficient to control it.



# A STUDY OF THE VESSELS OF THE EXTREMITIES BY THE INJECTION OF MERCURY\*

BAYARD T. HORTON

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THE surgical treatment in advanced cases of thrombo angutis obliterans and arterio clerosis involving the lower extremities when gangrene is present has been amputation either above or below the knee and yet there is no accurate clinical method for selecting the site of amputation in a given case. It has been shown<sup>1</sup> that in selected cases of thrombo angutis obliterans in which amputation is eventually necessary in approximately 80 per cent healing will take place when the level of amputation is below the knee whereas in cases of arterio sclerosis especially if the patients are aged more than sixty years it is almost invariably necessary to amputate above the knee. The older the patient apparently the less adequate the collateral circulation to the extremity for this reason relatively high amputation is necessary in older persons and frequently will take place below the knee in younger persons. The presence of a pulsating popliteal artery is not the essential factor in healing below this level although without a careful study of cases it would seem that the presence of a palpable popliteal artery would be the deciding factor as to whether in a given case amputation should be above or below the knee. Burke in a recent survey of a group of cases of thrombo angutis obliterans at The Mayo Clinic has shown that in twenty four in which amputation below the knee was successful there were pulsations in the popliteal artery in only nine. In the other fifteen cases the popliteal artery was occluded and yet healing was fairly prompt.

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The present study was undertaken in order to determine the extent of the occlusive process in amputated extremities and later quantitative studies of the filling of the arterial tree were carried out.

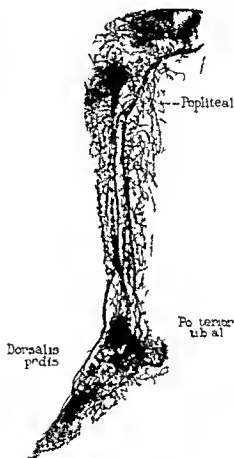


FIG 77—Normal left foot with mercury used for filling of the arterial tree. The foot was filled with mercury for fifty days.

Metallic mercury was used to inject into the arterial tree in forty two recently amputated extremities (Fig 77). Seventeen were in case of thrombo angitis obliterans and nineteen in

cases of arteriosclerotic disease. The others represented a miscellaneous group namely osteomyelitis sarcoma epithelioma clubfoot and ununited fracture. The injections were made under pressures ranging from 15 to 160 mm of mercury with the specimen in the horizontal position. Pressure of from 30 to 40 mm was used in the average case. Immediately after completion of the injection both flat and stereoscopic roentgenograms were made of the specimens. Later the specimens were dissected with the use of the roentgenograms as guides in the study of the arterial tree. An effort was made in each case to confirm the data shown in the roentgenograms by careful dissection of the arterial tree. Numerous sections of the veins and arteries at various levels were taken for microscopic study. All of the specimens were amputated just above or just below the knee joint with the exception of one arm which was amputated through the middle third of the humerus.

In the group of patients with thrombo angitis obliterans the youngest was aged thirty one years and the oldest seventy three. The latter represents the oldest patient whose case is on record at The Mayo Clinic. The clinical diagnosis was made prior to amputation. One patient was a woman aged sixty years whose right leg was amputated above the knee. This is the first case of thrombo angitis obliterans in a woman that has been seen at The Mayo Clinic. In the group with arteriosclerosis the youngest patient was aged forty eight years and the oldest seventy eight years. In a small number of cases of both thrombo angitis obliterans and arteriosclerosis the specimen was weighed before and after injection so that accurate data were obtained regarding the capacity of the arterial tree. Unfortunately data on normal extremities with which to compare these filling ratios are not available at the present time and none was found recorded in the literature.

In cases of thrombo angitis obliterans there were marked variations in the appearance of the various arterial trees depending on the extent of the occlusive process in the vessels. In some specimens (Fig. 18) the arterial tree appeared almost normal and in others (Fig. 79) the original arterial tree had been



entirely occluded and replaced by a collateral circulation which for a long period of time at least had been sufficient to supply the extremity with an adequate amount of blood. In Figure 18 the arterial tree appears normal except for the closure of the dorsalis pedis artery in its middle third and a slight filling defect on the lateral aspect of the great toe. Clinically the



popliteal artery was closed and pulsations could not be felt below this level. There was most gangrene along the distal lateral half of the great toe. The case represented in Figure 19 presented the same clinical features so far as the circulation in the extremity concerned as did the case represented in Figure 18. There was beginning gangrene of the distal third of

the great toe in this case also. Both legs felt cold. Pulsations below the femoral artery were absent. There was marked pallor when each extremity was elevated and marked rubor when it was placed in the dependent position yet the arterial trees were markedly different in the two cases. There is no clinical method at present for distinguishing between these two extremes. In the average specimen the occlusive process was diffuse but patchy in its distribution and formation of collateral



FIG. 10.—Arterial tree in a case of thrombo angitis obliterans in a man aged fifty to sixty years. The clinical duration of the disease was fifteen years. The arterial tree is not normal and formation of collateral vessels marked.

vessels was marked. This was the most striking feature observed in case of thrombo angitis obliterans. From the appearance of the roentgenograms it would seem that thrombosis of a segment of a vessel occurs, collateral circulation develops above it and then another segment closes. The ratio between the rapidity and extent of the occlusive process and compared with the formation of collateral vessel determines the ultimate preservation of the limb. If the segments affected are large and

the closure rapid the prognosis is poor if they are small and closure is slow the prognosis is good

A very unusual picture was observed in three amputated limbs following lumbar sympathetic ganglionectomy. In one case (Fig. 80) in which bilateral lumbar sympathetic ganglion



Fig. 80—V. I. T. n. case fth mbo g t bltra s  
w j t l y ft l l y p th t c g gl a t my t  
v sel th tt mpt t f t f c l l t r l s a c h w Th  
a ma s f t l y

ectomy had been performed one year prior to the amputation of the left leg above the knee a most interesting condition was observed. The injection material was introduced into the arterial tree under a pressure of 70 to 30 mm. of mercury and mass after filling the arterial tree flowed into the c

bed and into the venous system. Two months later the right leg was amputated and exactly the same result was obtained with injection. It required 55 c c of the injection mass to fill the vascular tree in the left leg and only 12 c c to fill the arterial

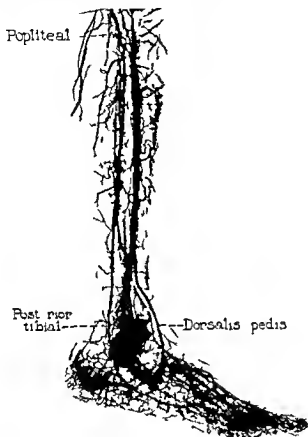
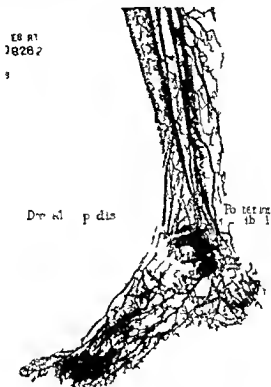


FIG 81—Arterial tree of retrocleros. Injection with mercury was made under pressure of 60 to 150 mm. Three weeks after a surgeon elsewhere had performed perirteral sympathectomy by trapping the adventa from a segment of the popliteal artery. The patient was a man aged sixty years. The name of the open collateral circulation is absent.

tree in a similar specimen (Fig. 81) obtained from a patient with arteriosclerosis. It is interesting in Figure 81 to note that the mercury did not pass through into the venous system to any extent even though elsewhere the patient had undergone peri-

arterial sympathectomy applied to popliteal artery by the Leriche Handley method three weeks prior to amputation. In a second case the patient had had his right leg amputated at its middle third fifty six days after bilateral lumbar sympathetic ganglionectomy had been performed. The specimen weighed



F 8<sup>7</sup> — A t l t ca f t l M y j t i  
 d p f 50 mm Th p t t w m g d t y  
 O l f th d sal ped d po t t b l t d t Fll g  
 t 48 p t

1155 gm. The injection material was introduced under a pressure of 15 to 20 mm of mercury. With this relatively low pressure the injection mass again passed through the capillary bed and into the venous system. When injection was made under 50 mm. pressure the vascular tree contained 345 gm.

or approximately 253 c.c. of mercury. A similar specimen from a case of thrombo angitis obliterans (weight 1940 gm.) in which the material was injected at the same time and under the same pressure and in which sympathetic ganglionectomy had not been performed required only 132 gm. of mercury (97 c.c.) to cause the arterial tree to be filled. Still another specimen (Fig. 82) (weight 4200 gm.) obtained from a case of arterio sclerosis when mercury was injected under the same pressure of 50 mm. required only 216 gm. of mercury or approximately 159 c.c. to fill the arterial tree. The filling ratio (weight of mercury injected divided by weight of leg after injection) in the specimen derived from a patient who had undergone sympathetic ganglionectomy was 25 per cent. that from the patient with thrombo angitis obliterans in whose case sympathetic ganglionectomy had not been done was 63 per cent. and that in the case of arterio sclerosis was 48 per cent. The filling ratio in cases of thrombo angitis obliterans ranged from 3 to 63 per cent. The venous filling ratio in a specimen from a case of thrombo angitis obliterans in which only the vein were filled was 12.8 per cent.

In cases of arterio sclerosis the results of observation were fairly constant. In most of the specimens the main arteries in the leg and foot were patent but were reduced in caliber whereas collateral circulation in many specimens was absent to a rather marked degree (Fig. 81). Frequently however occluded segments were observed in the main arteries and in a few specimens collateral circulation was well developed. In one case of arterio sclerosis the popliteal artery was completely occluded by a recent thrombus and the collateral circulation connecting the popliteal with the posterior tibial artery was well developed. This specimen was obtained from a man aged seventy eight years. If the same occlusive process had occurred in a younger person it is possible that the collateral circulation would have developed to a point at which amputation would not have been necessary. The filling ratio in these cases ranged from 5.8 to 55 per cent. The filling ratio in cases of thrombo angitis obliterans and arterio sclerosis are essentially the same. This

would indicate that the circulation in the two groups of cases must be reduced to essentially the same level before amputation is eventually necessary. The filling ratio in diabetic gangrene was slightly less than in the average case of arteriosclerosis not associated with diabetes mellitus. The occlusive process was so marked in six of the seventeen cases of thrombo angitis obliterans that I was not able to perform injection of the arterial tree and in the arteriosclerotic group I was able to carry out injection in fourteen of the nineteen cases. In five of the cases the occlusive process was so marked that it was not possible to inject the material into the arterial tree even using a pressure as high as 200 mm. of mercury.

Essentially the same data were observed in the roentgenograms with reference to the arterial tree in cases of diffuse osteomyelitis of the tibia and of arteriosclerosis. The main vessels in the leg and foot were open but collateral circulation in the leg and to a certain extent in the foot was practically absent. This brings up an interesting question and emphasizes that diffuse osteomyelitis of the long bones of the leg not only affects the bones but affects the blood vessel of the extremity to the extent that the collateral circulation of the leg may be partially or in extreme cases almost totally occluded.

Marked changes were not observed in the arterial tree in a leg which was amputated because of a severe radium burn. The ulcer occupied approximately the middle third of the anterior surface of the leg. The pathologist diagnosed the ulcer as malignant. Marked changes were not observed in a leg amputated because of sarcoma except that the vessels were slightly constricted and distorted as they passed through the sarcoma which involved the upper third of the leg.

In one specimen there was an ununited fracture in the lower third of the tibia and injection of the arterial tree showed definite constriction of the anterior tibial artery opposite the site of the fracture and marked diminution in the blood supply of the region of the fracture. Soft tissue was not present between the fragments which were in good apposition. The decreased blood supply was so definite that it may have been a

factor in the nonunion of the bone although one cannot draw accurate conclusions from a single case

The amount of the injection mass required to fill the arterial tree in cases of thrombo angutis obliterans and arteriosclerosis varies a great deal from that reported by Lewis and Reichert.<sup>3</sup> It required approximately 12 to 15 c c to fill the arterial tree in the average case of thrombo angutis obliterans in which amputation was done below the knee. In the average case of arteriosclerosis in which amputation was done at or above the knee approximately 18 to 20 c c was required to fill the arterial tree. The filling ratio in each case was essentially the same. Lewis and Reichert using Hill's mass of bismuth oxychloride injected under a pressure of about 200 mm of mercury found that it required from 100 to 120 c c to fill the arterial tree in a case of thrombo angutis obliterans as compared with from 30 to 40 c c in cases of arteriosclerosis. This marked difference was not observed in any of the cases which I have studied. The capacity of the vascular tree was reduced to a minimal amount before amputation was eventually found necessary.

It should be emphasized that lumbar sympathetic ganglionectomy does not produce cure in cases of thrombo angutis obliterans. In the three cases which are reported the occlusive process was progressive in spite of the increased flow of blood to the extremities following the operation and amputation eventually was necessary. The increased flow of blood to the extremities following this surgical procedure places the patient in a better position to ward off gangrene but unfortunately does not eradicate the disease. These injections give positive anatomic proof of the vasodilating effects of sympathetic ganglionectomy. They also confirm in general the clinical impression that the older the person the less adequate the collateral circulation. After a person reaches the arteriosclerotic age and arterial occlusion develops the ultimate amount of collateral circulation is usually inadequate and not comparable to that seen in younger persons with thrombo angutis obliterans. This affords a good reason for not attempting vasodilating operations such as sympathetic ganglionectomy for older patients suffering



from arteriosclerotic disease. It also explains the frequent failures in attempts to save stumps below the knee in cases of arteriosclerosis and the greater percentage of success following the same effort in cases of thromboangiitis obliterans.

### BIBLIOGRAPHY

1. Allen, E. V. and Maynard, H. W. Surgical treatment of the foot and ankle in (thromboangiitis obliterans). *Ann. Surg.* 1938, 106: 260-266.
2. Baker, C. F. and Piers, L. M. *Ann. Surg.* 1938, 106: 260-266.
3. Lewis, D. and Roberts, F. L. The treatment of the foot and ankle in (thromboangiitis obliterans). *Ann. Surg.* 1938, 106: 260-266.

## POSTOPERATIVE TREATMENT OF ABDOMINAL ACTINOMYCOSIS<sup>1</sup>

FRIEDRICK L. SMITH

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MANY treatments have been recommended by those interested in the study of actinomycosis. The satisfactory results obtained by New in the treatment of actinomycosis of the jaw and neck are well known. copper sulphate taken internally and given by irrigation are well recognized methods of treatment. the British have reported apparently favorable results with potassium iodide in huge doses with sodium iodide given intravenously and with colloidal iodine but none has been entirely successful used alone when the thorax or abdomen is involved. The unsuccessful results may be accounted for to some degree in that thoracic and abdominal types of the disease especially remain undiagnosed for long periods of time and marked involvement with physical debility has occurred. This paper will have to do with treatment of the abdominal type of actinomycosis.

The diagnosis once established one must decide on the extensiveness of the disease whether metastatic involvement through the blood stream or lymphatics or by direct extension to the liver and thorax has taken place how much local involvement there is the chances of surgical operation eradicating the infection by excision and whether satisfactory drainage can be established.

When surgical methods are resorted to unless the affected area can be totally excised the wound should be left open as far as possible for the purpose of packing and topical treatment. If multiple sinuses persist all should be opened sufficiently either to allow of them being packed or to permit plenty of

<sup>1</sup> Read before the Association of Resident and Ex-Resident Physicians of The Mayo Clinic and The Mayo Foundation October 9 1929

**drainage** The characteristic sealing in of the ray fungus in the traumatic tract effected by the throwing out of exudate and by burrowing must be constantly looked for for as soon as the fungus is permitted to remain unexposed grouping takes place and an abscess results. A wound may look clean it may have been packed tightly every twenty four hours and yet a new abscess may be establishing itself in close proximity to the treated wound. Patients should be closely watched as to weight temperature and general health. If the patient says that he has noticed a slight pain for the last two days or so he should not be told that pain is to be expected on account of injury to nerves and muscles but his temperature should be taken and a blood count should be made. Probably the observer will be surprised to find a slight or moderate rise in temperature and a slight loss of weight and appetite. At any rate the wound should be investigated and although the granulation may seem to be firm it may be possible with a curved forcep to uncover a large abscess. This should be opened immediately as widely as possible and the wound should be thoroughly packed. Solution of copper sulphate 1 per cent of potassium permanganate 0.003 per cent and of iodine 1 to 2 per cent all have been used in medication. The topical therapeutic agent should be one that does not cause coagulation of the tissues for coagulation would help to seal in the pathologic process present. The ideal topical agent will dissolve the exudates expose the tissue to the action of oxygen and at the same time will unite with the proteins of the tissues and deliver to the infected area a bactericidal agent. For this reason dichloramine T in a 4 per cent solution is of value in open wounds or deep tracts. Another agent which has proved satisfactory is compound solution of iodine (Lugol's solution) diluted one third to one half with water. The edges of the wound in both instances necessarily have to be well protected with strips of gauze covered with petrolatum applied well over the edges of the wound or severe dermatitis will follow. There is one detail which should be emphasized in the packing of a cavity and especially if it is deep and narrow. Gauze saturated with the drug should be

straightened out and the instrument carrying the gauze should be inserted to the bottom of the tract and kept there. The gauze should be fed in slowly. If the packing instrument is withdrawn it pushes in several coils of gauze which will plug the tract exterior to the place where the gauze should be applied. Thereby a space is left intervening with possibly only one strand of the gauze between; this permits granulation and exudate to fill the space and on removal of the pack the next day one observes an irregular narrowed tract.

Our procedure is as follows. As soon as the patient arrives at the dressing service the wound is explored and if it is not satisfactorily clean it is douched with hydrogen peroxide solution for fifteen or twenty minutes until it is certain that the tract is cleaned of exudate. Then the tract is gently swabbed out until it is dry and if dichloramine T is used it is applied as has been described. If compound solution of iodine is used drying is not necessary. It is my custom when sulphur bodies are repeatedly found in the sulci of the wound to have radium introduced. Treatment by roentgen ray is applied to the whole region. Moreover these patients are saturated with iodides; either solution of sodium iodide 10 per cent is given intravenously beginning with 30 to 40 c c and increasing 10 c c each day up to 100 c c for each day or saturated solution of potassium iodide is administered by mouth beginning with 40 drops three times a day and increasing to as much as 180 drops three times a day depending on the tolerance of the patient. The intravenous method of administration has a greater tendency to destroy the appetite than the giving of potassium iodide by mouth. However the latter method also is irritating to a slight degree. Administration of tincture of iodine beginning with 8 minims and increasing to 15 minims in cream three times a day may be substituted for the potassium iodide. The finely divided colloidal suspension of iodine in cream is easily taken and has no disagreeable taste. Epstein and Schoenholz recently reported the results of treatment with foreign protein in the case of a patient whose neck was involved. This patient received four intravenous injections given at interval of three days of killed

typhoid and paratyphoid organism. These four injections contained respectively 75 000 000 100 000 000 125 000 000 and 150 000 000 organisms. Each treatment was followed by a chill and slight rise in temperature. The patient was in the hospital nine days. Three months later he was reported to be apparently well. General application of ultraviolet or solar rays is indicated to maintain bodily tone and especially when the patient is susceptible to iodide rash. Ultraviolet rays will arrest the papular eruption but will not disperse it completely unless treatment is given every day or so. Cod liver oil if borne well is beneficial.

Of the twenty-four patients who were treated surgically at the clinic eleven have lived for one to nine years. Of these eleven patients nine are well according to latest available records. Two are still under treatment, one of whom has a fecal fistula but is otherwise well and in one of whom a sinus persists. Seven of these eleven living patients received open surgical treatment, ten were given radiotherapy and all eleven received medication. Thirteen patients are dead, all of whom died within the first year of the beginning of treatment. Of these thirteen patients two received open surgical treatment, three were given radiotherapy and twelve received medication.

In conclusion, although medication with iodides in some form in conjunction with radiotherapy and open surgical treatment is the proper procedure, stress should be laid on close observation of the treated wound in order that reinfection of the tissues contiguous to the operative tract shall not occur.

